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FLIGHT

AIRCRAFT, SPACECRAFT, MISSILES

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Editor-in-Chief
MAURICE A. SMITH D.F.C.

Editor
H. F. KING M.B.E.

Technical Editor
W. T. GUNSTON

Production Editor
ROY CASEY

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No More Pursuit Ships

SINCE the Defence White Paper of 1957, it has seemed probable that the Lightning would prove to be the last intercepter for the R.A.F.; the last, that is, which would have the task of effecting an interception itself, and not with the missile it carried. But this does not necessarily mean that the Lightning will be "the last manned R.A.F. intercepter." The future course of fighter development seems clear: air-to-air missiles will get ever larger, until the function of the carrier aircraft will merely be to start the missile on its flight, at perhaps 50,000ft and a few miles nearer its quarry than would otherwise be possible.

Advocates of the highly supersonic intercepter were saddened when the great technical achievement of Avro Aircraft, the CF-105 Arrow, was cancelled early this year. Now their final bastion has fallen: on September 23 the U.S. Department of Defense cancelled Weapon System 202, the vehicle portion of which was the North American F-108 Rapier two-seat fighter. Although Air Defense Command officers presented a good case for its retention, this 2,000 m.p.h. intercepter was caught in a budget pinch between its stable-mate, the B-70 Mach 3 bomber, and the Atlas, Titan and Minuteman ICBMs. All required enormous funding and, to quote a general, "something had to give." The fighter gave.

Belshazzar and the Transall

CAN a model aeroplane be described as the writing on the wall? Metaphorically, perhaps, yes; and to our way of thinking a model recently completed by Nord-Aviation demands the closest attention of the British industry. It represents a Franco-German project, the twin-Tyne Transall.

We do not suggest that, like the knees of Belshazzar at his impious feast, our own are smiting one against the other as we contemplate this model. It is only too easy to imagine that every cardboard aviation project represents a challenge to Britain's aircraft industry. But no astrologers, Chaldeans or soothsayers need to be brought in to interpret the significance of this project. To quote Nord, the Transall "*realisera probablement pour la première fois dans l'histoire de l'aviation l'étude d'un avion à l'échelle supra-nationale.*"

The project epitomizes the new *entente*, which is rooted in the spirit and ideals of the European Common Market, between the aircraft industries of France and Germany. A million man-hours separate a model and a brochure from the hard-won transport *savoir faire* of firms like Douglas, Lockheed or Vickers. But, like the new airline alliance Air Union, the Transall represents a challenging trend.

This new Franco-German axis has developed out of close co-operation on a number of projects. For example, the Nord Noratlas transport—from which the Transall indirectly springs—has been built in large numbers both in France and Germany. The Bréguet 1150 maritime patrol aircraft with twin Tynes, and the Raytheon Hawk anti-aircraft missile, will be developed for NATO by France and Germany, assisted by other member-nations. Messerschmitt are making France's Fouga Magister. The revolutionary SNECMA Coléoptère is Franco-German.

No one can foretell with certainty the extent to which these Continental consortia will diminish the future aircraft markets of the British aircraft industry. Rolls-Royce, it seems, are actually benefiting. But Rolls-Royce enjoy a special position, which they owe not only to their reputation, but also to their great resources.

SABRE BOOSTER? Australian Government senior production officials recently visited the Napier development establishment at Luton. In this group, at a Double Scorpion test-bed, are (l. to r.) Mr. H. P. Matthews, senior London representative of the Department of Supply; Mr. E. W. Bruce Hill, Napier; Mr. T. Shelton, chief project engineer, Government Aircraft Factory; and Messrs. P. Ramsden and W. Shirley, Napier

FROM ALL QUARTERS

Five Per Cent Up

AUGUST exports by the aircraft industry—£12,171,098—brought the total for the first eight months of 1959 to a record £111,644,249, an increase of five per cent over last year's figure for the equivalent period. A breakdown of the January-August total shows that only sales of aircraft and parts (£63,777,935) were lower than in the equivalent period last year, when they reached £70.1m. All other totals show an increase on those for 1958, which are given in brackets: aero-engines, £42,911,530 (£32.3m); electrical equipment, £2,621,174 (£2.2m); aeronautical instruments, £1,806,147 (£1.3m); and tyres, £527,463 (£368,000). The leading buyers were India (£12.4m), Switzerland (£6.5m) and Western Germany (£5.4m).

S-62 on the Thames

NEARING the end of its European sales tour, the first prototype Sikorsky S-62 amphibious helicopter (G.E. T58 turbine) demonstrated its capabilities in London on September 23. Four flights were made from the Westland Heliport at Battersea for the benefit of two dozen guests of United Aircraft and Westland, representing B.E.A., the Royal Navy, de Havilland Engines, Iraq Petroleum, the Port of London Authority, M.T.C.A. and others. Flags on the hull of Sikorsky's 8-12 seat amphibian recorded visits since the Paris Show to Belgium, Germany, Denmark, Sweden, Norway, Holland, Austria, Switzerland and Italy.

The S-62 first flew on May 22 last year, and F.A.A. certification is expected next month. T58 deliveries are due in late December, and S-62 deliveries can be made "soon afterwards."

New Research Aircraft

ACCORDING to the London *Daily Express*, "a wooden aeroplane is being built for the Ministry of Supply to help in the investigation of the problems of flying supersonic airliners. The aircraft is being built by Handley Page and is expected to fly next summer."

No official reference has been made to such a project, but it would be logical to build a cheap and versatile machine capable of exploring the low-speed characteristics of future supersonic transports. According to the source quoted above the Handley Page aircraft will be some 40ft in length and have an acute delta wing with a span of some 20ft. A single-seater, it is said to be of wooden construction and to achieve up to 300 m.p.h. on the power of a Bristol Siddeley Viper.

For research at the extreme upper end of the speed scale, and to assist in the development of new powerplants, work is well advanced on the Bristol T.188. Powered by one or more de Havilland Gyron Junior DGJ.10R turbojets, the T.188 is officially described as a "stainless-steel supersonic research aircraft" (it is also said to embody ceramic materials in its structure), and unofficial reports credit it with a design speed of over 2,000 m.p.h. The first is said to be due to fly next spring.

Hospital by Helicopter

A NEW means of bringing fully equipped hospital facilities to the battlefield is being demonstrated by Westland Aircraft Ltd. in this year's Army Medical Services exercise at Mytchett, Hants, next Sunday. The company is exhibiting a full-size mock-up (10ft 5in by 8ft 5in by 36ft) of a utility pod fitted out as a mobile operating unit. This pod, about the same size as a coach on a London Underground train, is designed to be carried by a helicopter developed from the two Westminsters. The utility pod has large let-down doors at each end, and two small doors on each side leading into large tented structures with rigid flooring. It is proposed that the pod itself be used as a central area for sterilizing and storage and that the tented structures house an anaesthetic room, operating room and recovery room. The rigid flooring would fold up in two sections externally, on either side of the pod, and the tentage also be carried externally. Westland state in their description that "in practice it is probable that the pod would carry all medical stores internally, and have electrical and h.c. water systems . . . from an external mobile source." One pod, it is claimed, could evacuate 40 casualties; while a field medical company with attendant equipment, capable of looking after 100 patients for eight days, "could possibly be transported in four pods."

Shipshape Sessions

BRISTOL, that seafaring city, was host on Thursday and Friday last week to airfarers—some 130 members of the Aerodrome Owners' Association and their guests, meeting in annual conference. The venue was appropriate for the conference: A.O.A.'s founder, Mr. R. Ashley Hall, is a Bristolian; and as the Association now includes owners (or potential owners) of helicopter stations it was fitting too that on the opening day members should have had a talk on *The Future of Helicopter Services in the U.K.*, given by Mr. Peter W. Brooks, technical assistant to the chairman of B.E.A. With lantern-slide illustrations he talked about experimental work the Corporation had been doing since 1948, seat-mile costs, BEAline "bus routes" planned to start in the 1960s, and basic requirements for heliports. Brussels, he said, had been fortunate in having a ready-made site—a disused railway-station in the city centre; three areas were proposed for London's heliport—two of them on the river, near Victoria and Liverpool Street stations, and one north of King's Cross.

A.O.A. members, responsible for non-State aerodromes in the U.K., also heard a spokesman for non-State air companies—Mr. Eric Rylands, president of B.I.A.T.A. and a recent successful exponent of inter-city (London - Paris) travel, who said that many members of his Association considered they could run this country's internal network more profitably than B.E.A. are doing now, if given the opportunity. Whatever government we had after October 8 should "take a very close look at these services." To the owners he said: "You want your airports used; we want to use them." This drew an enthusiastic response from Ald. V. T. Ross, chairman of the A.O.A., who, speaking in his capacity as a Bristol alderman, said that Lulsgate Airport had cost about £½m but he thought the city's finance committee "would pay another £¼m to get more services."

After its discussions the Association spent the remaining conference time visiting not only Bristol's airport but also the production divisions of the aircraft company which bears the city's name; and members were entertained for lunch by the city council and also—on the following day—by Shell-Mex and B.P. Ltd. at Weston-super-Mare.

U.S. Imports at Fairoaks

LIKE Miss Universe contestants at the village fête, in brilliant sunshine and under gay bunting, the colourful Piper range of aeroplanes was on show at Fairoaks Aerodrome, Surrey, last weekend. The occasion was a sales experiment arranged by Vigors Aviation (a subsidiary of Irish Air Charter) to bring the Pipers to the attention of business men and potential private owners in the area. Some 170 invitations had been issued—through local clubs or by direct approach to business concerns—to inspect and to fly an Apache, a pair of Comanches, a pair of Tri-Pacers and a Super Cub.

Since restrictions on the import of American light aircraft were lifted on June 8, interest in these welcome newcomers has been

"Flight" photograph

AUTUMN COLLECTION at Fairoaks: the display of Piper executive and private-owner aircraft described in a news-item above

considerable; Mr. Tim Vigors, managing director of Vigors Aviation and Irish Air Charter, says that in the past 11 weeks sales have been at the rate of one a week. Already sold in this country—mostly since June 8—are a Comanche, five Apaches (three delivered), six Tri-Pacers and five PA-18-As for agricultural work. A spares pool and servicing facilities are being set up at Kidlington and some of the wide range of radio available—notably the Collins 51X-3 190-channel V.H.F. and V.O.R. receiver—has M.T.C.A. approval for transport-category use.

Prices of 1959 standard models, less radio, landed in England with duty paid but prior to customs clearance, are as follows:—Apache 160, £16,580 5s 2d; Comanche 250, £8,881 18s 2d; Comanche 180, £7,203 6s 9d; Tri-Pacer 160, £4,193 13s 2d; Caribbean 150, £3,986 17s 2d; PA-18 Super Cub 150, £3,623 7s 4d; PA-18 Super Cub 95, £2,951 18s 2d; PA-18-A 150 with dusting and spraying equipment, £4,388 0s 9d. Autoflite (the Piper autopilot system) and "super custom" interiors and equipment are extra.

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ELECTION PLATFORM

Aviation Policy: Two Special Messages to "Flight"

The Conservative Case . . . . by JOHN HAY*

DESPITE the remarkable developments of the post-war years, world air transport is still in a relatively early stage of its potential growth. Mass air travel has not yet become a complete reality. But already the signs are there to be read; the next decade will undoubtedly bring a massive upsurge in popular demand for this fast, clean and safe method of transport, both of passengers and freight.

It is a vital interest for Britain to be in the van of this coming advance. We lie at the centre of the world's land-mass, with a unique strategic position. We are already the largest traffic generator in Europe. Our aircraft industry contributes substantially to our exports; so far this year the exports of airframes, engines and components are running at an annual rate of £167 millions, while its work of aeronautical research has wide repercussions in other branches of engineering and technology.

Conservative policy in aviation is therefore designed to achieve two objectives: the maintenance of Britain's present position in an increasingly competitive world, and the creation of new opportunities for our aircraft industry and airlines.

The industry is undergoing a difficult period of re-adjustment from its peak level of 1951. Changes in defence policy have much reduced military demand for manned aircraft. Airlines have invested so heavily in jets that new orders have been severely cut back, while their fleets of piston-engined aircraft are still giving good service.

To meet this situation our policy is the practical one of fostering reorganization into fewer, but stronger, units, while seizing every opportunity of helping the development of novel and promising new projects, such as the Rotodyne and the SR-N1 Hovercraft. We intend to place contracts for design-studies of a supersonic civil aircraft. We shall continue the policy of intelligent and selective financial support of design, research and development; £550 million has already been provided in this way. Where possible, military and civil orders for the same basic types of aircraft and engines will be combined.

But this alone will not be enough unless we can also expand the market for British air services of all kinds, leading to more orders for the aircraft industry. We are convinced that this can best be achieved by a determined policy to reduce air fares to attract a larger travelling public. With our full support, British airlines are already pressing in I.A.T.A. at Honolulu for a "lower fares" policy. If international agreement cannot be achieved, we shall consider what action we can take in our own cabotage area.

To help the process we shall also confer wider freedom and greater flexibility upon our own airlines—both independents and corporations. B.O.A.C. and B.E.A., our flag-carriers, must continue to receive our full support, but we believe that a substantial contribution can be made by the independents, pioneers in new fields of mass travel such as inclusive holiday tours. We shall set up a new and independent licensing authority to give greater freedom in routes and services to both, and will, as a corollary, repeal those provisions of the Air Corporations Act which gave the corporations a monopoly of scheduled services. Thereby we are certain greater opportunities will be created for both public and private sectors.

It is also our hope that yet closer co-operation between all the airlines of the Commonwealth can be achieved, for the mutual benefit of all. We shall work on to this end.

We shall continue to support in all appropriate ways the private and club flying movement. The work being done by the Standing Joint Committee on Private and Club Flying and Gliding, of which I am chairman, will be pushed ahead with all practicable speed.

In this dynamic era there are many problems to meet and surmount. Our Socialist opponents have offered plenty of negative and unhelpful criticism, but few constructive ideas or practical policies. The Conservative Party is determined that Britain shall play as vigorous a part in the further development of aviation in an air-faring age as she did in building commerce and communications across the oceans of the world.

Labour's View . . . . by FRANK BESWICK†

THERE is nothing basically different between the aviation objectives of the political parties; all accept the importance to the modern British economy of air transport and an aircraft construction industry. Expansion is the declared common aim.

It is not, therefore, objectives but judgment and actions—in relation to those objectives—which are at issue.

The Labour Party places its trust in the national air corporations—the chosen instruments—for the expansion of British air transport. The Conservative Party insists in treating this question as one of public *versus* private enterprise. It is a pity. It is also false. It would be better argued as an issue of competition *versus* qualified monopoly, examples of which can be found in both the private and public sector of our economy.

In the judgment of the Labour Party—as in the judgment of that successful Conservative Minister the late Sir Kingsley Wood, who brought in the Bill establishing the British Overseas Airways Corporation—air transport is a natural (qualified) monopoly. I say qualified because a British operator obviously is in competition with carriers of other nations. Moreover it is not suggested that there should be one organization monopolizing all Britain's air transport; the "natural," sensible, efficient and economic monopoly is on one service or route or area.

If experience showed, as some critics attempt now to prove, that the operations of one corporation were getting too large or too unwieldy for efficient management, then the logical extension of Labour Party policy would be the establishment of an additional corporation with responsibility for a separate route-pattern.

Alternatively there is the proposal, well worthy of study, for one body, a British Air Transport Council (with some full-time and part-time individual members) responsible for general policy and answerable to which would be separate divisions or corporations each managed by a full-time executive body. Each division would be independent in management and accounting. The parent body would be analogous to a holding company. It might conceivably be justified to set up a third division or corporation for the development of traffic to Central and South America.

The question of the relationship between the corporations and the Minister responsible for Civil Aviation has been raised; and there has been criticism, notably in the recent Select Committee Report, of "interference" on the part of the Minister. I do not believe there is any real problem here, provided there is harmony between the general long-term policy of the Government and the expansionist aims of the corporations. The real trouble in recent years has arisen from the Minister's anxiety to provide routes for independent companies contrary to the provisions of the Air Corporations Act.

Clearly, a Minister answerable to Parliament must have ultimate responsibility for the general policy of publicly owned corporations. "Interference" in technical and commercial decisions ought to be out as a matter of common sense in administration. If the Minister declares it essential to use his ultimate authority in matters of commercial judgment then there is a case for that authority to be exercised openly in a directive. Having said that, we should not under-estimate the obvious advantages of a fairly close and sympathetic liaison.

Much has been said recently about cheap fares. Any government must favour the principle of low fares. There is an especial incentive for a Labour Government to bring air travel within the reach of the income bracket from which, in the main, it draws its electoral support. But it would be unwise to ignore what has been

(*Concluded on page 332*)

*** Mr. John Hay is Joint Parliamentary Secretary to the Ministry of Transport and Civil Aviation. In the Parliament just dissolved he was Member for the Henley Division of Oxfordshire. He served in the R.N.V.R. during the 1939-45 war.**

† Mr. Frank Beswick, who until the dissolution was Member for the Uxbridge Division of Middlesex, was Parliamentary Private Secretary to the Under-Secretary for Air in 1946-49 and Parliamentary Secretary to the Ministry of Civil Aviation in 1950-51. His war service was in R.A.F. Transport Command.

Missiles and Spaceflight

SPACE FOR THE U.S.A.F.

In Washington on September 23 it was announced by the U.S. Department of Defense that sole military responsibility for all "space transportation" and rocket boosters for spacecraft would, from that date, be transferred to the Air Force. This is a decision of the utmost consequence, and its ramifications have already been far-reaching.

Management of these advanced systems will presumably be vested in Space Technology Laboratories, for whom Thompson Ramo-Wooldridge are trying to find a buyer. The Defense Department's own Advanced Research Projects Agency has surrendered its interest in spaceflight, and will henceforth be interested in "space" only in such connections as defence against ballistic missiles.

The decision to give the U.S.A.F. a monopoly in space has been a bitter blow to the U.S. Army and Navy. Both the latter services were well advanced with a number of space programmes and, although these have not been cancelled, the Air Force will now supervise the entire rocket-boost portion of each mission. As an example of what the changeover means, the giant Saturn booster (*Flight*, August 21) will be taken from the Army Ballistic Missile Agency and given to the U.S.A.F.

U.S. EYE WOOMERA

The Weapons Research Establishment's range at Woomera is the largest overland missile range outside the Soviet Union. Now being instrumented over a stretch of 1,400 miles to Port Hedland on the coast, it will shortly be possible to fire a Blue Streak over its full 2,500-mile range, the final 1,100 miles lying over the Indian Ocean. The first emplacements for Blue Streak are now in an advanced stage of construction, their location being at a cliff-face near Lake Hart some 40 miles north-east of Woomera. In view of the fact that Woomera is so far from a source of liquid oxygen it is not surprising to read in the London *Times* that a lox production plant is under construction near the Blue Streak pads.

According to the London *Daily Mail* the United States Government are anxious to establish American missile and space teams on the Woomera range. This would, *inter alia*, enable hardware to be recovered from flights a dozen times longer than any which can be achieved at White Sands (the longest American overland range). Last week the Woomera range was inspected by the U.S. Defense Secretary, Neil McElroy, and the U.S.A.F. Chief of Staff, General Thomas D. White. On September 23 the Australian Minister of Supply, Mr. Alan Hulme, stated that Britain supported Australia in welcoming American interest in the range.

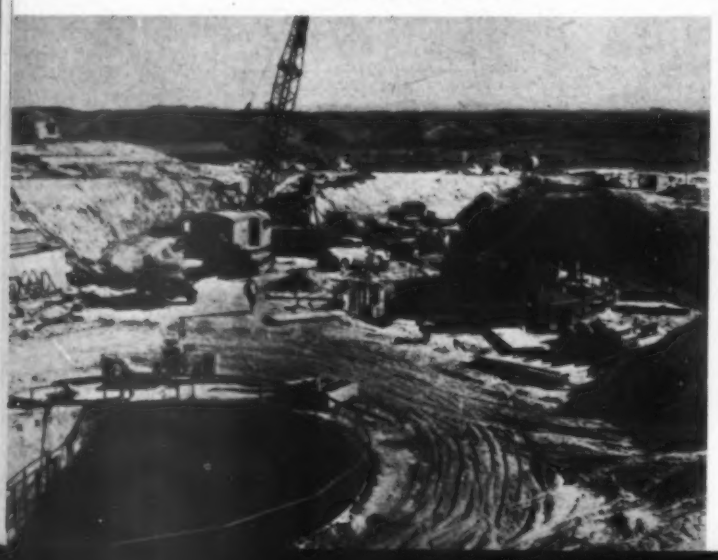
TITAN HARD PADS

In an accompanying photograph work is seen in progress on the silos which are being installed at Vandenberg A.F.B. to house Titan ICBMs of the U.S. Air Force Strategic Air Command. Unlike all earlier ballistic weapons, Titan is stored vertically, although the two stages are not normally joined until shortly before the missile is required for use. Each 92ft missile is housed in a vertical silo with a depth of 155ft. Connected to the silo by tunnels are additional underground pits for the propellant-loading and equipment-storage facilities, the latter silos being linked by further tunnels with the power house, control centre and propellant terminal facilities, all of which are underground. The main missile silos contain elevators to raise the Titan above the ground immediately before launching.

Although the installation at Vandenberg is primarily for training and development purposes construction has now begun on complete facilities for operational Titan squadrons. Furthest-advanced is Lowry A.F.B., Colorado, where the emplacement for the first squadron is well in hand; some $47m has been programmed for Ellsworth A.F.B., near Rapid City, South Dakota, which will be complete in 20/24 months' time, ground will be broken in November at Larson A.F.B., Wash., and further bases will be at Mountain Home A.F.B., Idaho, and Beale A.F.B., Cal.

Titan missiles are manufactured by The Martin Company in an *ad hoc* plant near Denver, Colorado. Although in no sense a hard-pad installation, certain test stands at the Denver facility could actually be used to launch Titan under dire emergency. According to *Aviation Week*: "Stands . . . could withstand only a single launch."

This photograph shows the stage of construction reached last month in installing silos for Titan ICBMs at Vandenberg A.F.B., Cal (see accompanying news-item)



RED TOP?

Although no such appellation has been acknowledged in the United Kingdom, it appears that Red Top is the code name of the successor to the Firestreak upon which de Havilland Propellers are known to be working. One is led to this conclusion by the following passage taken from our American contemporary *Aviation Daily*: "Navy's Eagle air-to-air missile program may receive a dividend from flight tests of England's air-to-air Red Top missile in the form of an exchange of technology. The information may lead to earlier availability of the Eagle, U.S. observers at the Farnborough air show report. . . .

"The Red Top, being developed by de Havilland Propellers, is said to carry a 68-lb non-nuclear warhead over a range of 14,000 yd. It may be an advanced version of the Firestreak. Red Top would be carried by the de Havilland Sea Vixen. It has infrared guidance using a cooled lead telluride cell receiving in a 4-to-5 micron range."

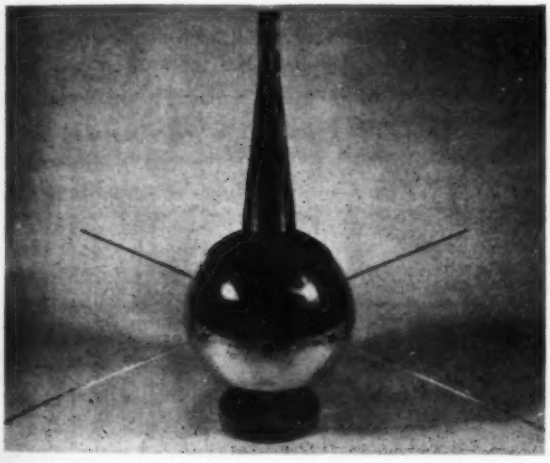
Below is a photograph showing the automatic ignition of the first Polaris fleet ballistic missile of the U.S. Navy to be launched from a surface ship. Fired on August 27, from U.S.S. "Observation Island" off Cape Canaveral, the Polaris functioned satisfactorily. The objects near the missile are shoes which locate the weapon in its launching tube; the muzzle of the latter can be seen in the inset

Depicted in an accompanying photograph is the Vanguard 3 satellite which was successfully placed in orbit by the last of the Vanguard vehicles (satellite launching vehicle 7) on September 18. The satellite itself comprised a 20in sphere, above which is mounted a 26in tapered glass-fibre tube carrying at its extremity a magnetometer to measure the Earth's magnetic field. Other instrumentation is intended to investigate Solar X-rays, temperature inside and outside the satellite and micrometeorite bombardment.

Late on September 20, Moscow radio stated: "It has become known that the processing of the data of observation of the flight of the Soviet space rocket, which was launched to the Moon on September 12, has confirmed that the surface of the Moon has been reached not only by the container with the scientific and measuring equipment, but also by the last stage of the rocket itself. The preliminary data received makes it possible already to establish at present that no magnetic field was discovered in the vicinity of the Moon."

Although Transit 1 (see illustration) left Cape Canaveral cleanly on September 17, the third stage of the Thor-Able which carried it failed to ignite and the satellite therefore did not achieve orbit. Transit 1 was a 36in sphere, weighing 265 lb, carrying special transmitters from which it was hoped ground stations would be able to determine the amount of refraction resulting from passage of radio waves through the ionosphere. This information is necessary before satellites can be used for navigational purposes.

Douglas Aircraft have selected the missile and space vehicle division of G.E. to develop the nosecone for the GAM-87A air-launched ballistic missile for the U.S. Air Force.

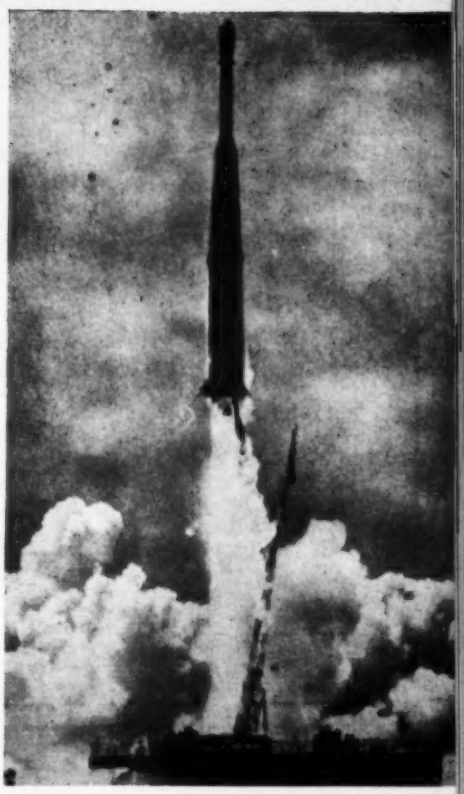


It was announced by the Advanced Research Projects Agency last week that G.E.'s missile and space vehicle division and Bendix Aviation Corp. will jointly develop the Task Steer satellite element of Program Notus. Task Steer will be a Polar communications vehicle repeating real time in order to provide instantaneous relaying of any kind of radio signal between widely separated ground stations or aircraft. Orbiting across both Poles at an altitude of several thousand miles, it will be particularly valuable in high latitudes, where radio communications are currently unreliable. The boost vehicle will probably be a Centaur.

Initial operational capability was achieved by the U.S.A.F. Strategic Air Command with the Atlas ICBM on September 9. On that date a D-type Atlas was successfully fired from Vandenberg A.F.B. by a crew drawn entirely from S.A.C. Carrying an instrumented nose-cap, the missile was aimed to impact near Wake Island, some 3,800 miles from the pad. Atlas thus becomes the first intercontinental ballistic missile to become effective outside the Soviet Union.

According to Dr. Herbert F. York, head of the division of research and engineering of the U.S. Department of Defense, "American missiles are accurate enough to hit the Moon, but they lack boosters powerful and reliable enough to carry the necessary guidance systems." On the same occasion he said that "the Soviet Union have the accuracy to hit New York City with a missile fired from Moscow."

The following is a partial text of a release dated September 16, from the U.S.A.F. Ballistic Missile Division: "A full-sized model of the Air Force Minuteman was fired successfully from its underground silo launcher yesterday at Edwards A.F.B., Cal. The test was the first of a series to investigate the design of the operational launch silos. Only the first stage fired in the test launch was 'live.' The second and third stages were dummies approximating the actual stages in size, weight and configuration. The first stage utilized only enough propellant to accomplish the launch from the silo. It was designed to burn for only a few seconds. The entire missile was tethered for the test. It was restrained from free flight by 2,000ft of nylon cable in the shape of an inverted Y attached to the nose of the missile."



As noted in an accompanying paragraph, Transit 1 failed to orbit on September 17. This photograph shows the size of the container needed to house the 36in sphere

Referred to in an accompanying news-item, this satellite (Vanguard 3) was placed in orbit on September 18, and is expected to remain in orbit from 30 to 40 years. The satellite weighs 50 lb, the same as the third-stage casing which is orbiting with it; apogee and perigee are respectively 2,300 and 315 miles

Atlas-Able 4, an Atlas carrying the same upper stages as those employed in Thor-Able 3, exploded on the pad during a static firing test at Cape Canaveral on the morning of September 24. The launch was scheduled for October 3, owing to the proximity of the Moon to the Earth at that time (some 219,000 miles). Atlas-Able 4 was intended to put a 375 lb paddlewheel satellite in orbit round the Moon. Its failure caused NASA to announce a "re-examination" of the entire American space programme.

On September 22 the Electric Boat Company—division of General Dynamics Corp.—launched U.S.S. *Patrick Henry* at Groton, Conn. This is the second FBMS submarine designed to carry and fire the Polaris ballistic missile. She should be commissioned next April. The first, the *George Washington*, will enter service later this year; and seven others are under contract.

It is not generally known that Reid & Sigrist developed the gyroscope for the Australian Malkara anti-tank missile. Although experienced in handling such work for British guided weapons, the company's design team had to solve many new problems in meeting the operational requirements of Malkara.

Still the centre of an intense political battle, Nike Zeus is still being supported by new contracts. Last month the U.S. Army allocated nearly $4.5m for Zeus test facilities at Point Mugu, California, and Kwajalein and Johnston Islands in the Pacific. Moreover the entire programme has been strengthened on a long-term basis by increasing the fiscal year 1960 appropriation to Zeus by $375m.

Photographs have been released by the U.S. Air Force showing the effect of a direct hit by a Sidewinder air-to-air missile upon a Radioplane Q-4. Taken on the range at White Sands these photographs are the first to give an indication that Q-4, a turbojet-powered supersonic drone, is in operational service.

Speaking before the American Rocket Society, Vice-Ad. Robert B. Pirie has forecast that the United States will shortly have a military "space service." He suggested a Military Space Command administered by the Joint Chiefs of Staff.

On September 16 a production Atlas D successfully accomplished a flight of 6,400 st. miles down the Atlantic Missile Range. No attempt was made to recover the nosecone, which was of the G.E. copper heat-sink type.

American Machine & Foundry Co. and ACF Industries are promoting a ballistic-missile launcher mounted on a enclosed railway truck.

To clarify the reshuffle of U.S.A.F. guidance systems for ICBMs: Atlas started with a General Electric/Burroughs radio/inertial system, but is going into production with the all-inertial guidance developed by Bosch Arma for the Titan; Titan, initially with the Bosch Arma inertial equipment will now enter service with Atlas's original radio/inertial system and will eventually have a completely new all-inertial guidance by I.B.M., the airborne digital computer and stabilized platform having both been assigned to the AC Spark Plug Division of General Motors. The second-generation ICBM Minuteman will have a new all-inertial system, of exceptionally light weight and low first cost; the contract for the system has been placed with the Autonetics Division of North American Aviation.

A Lockheed Constellation of K.L.M. casts its shadow over the temporary wooden buildings at Schiphol. A new terminal is under construction

AN ANNIVERSARY

HISTORY OF K.L.M.

By B. VAN DER KLAAUW

The Flying Dutchman is Forty

THE oldest airline company in the world still operating under its original name, K.L.M. Royal Dutch Airlines, will celebrate its fortieth anniversary on October 7. From a small company with two converted wartime reconnaissance aircraft and a staff of twelve it has grown into one of the largest airlines in the world, operating a fleet of 91 aircraft to 105 cities in 74 countries and having a staff of 17,000 people. And all this is the product of the vision, skill and endeavour of one man: the late Dr. Albert Plesman.

When during the first world war young Plesman was on active service as a lieutenant with the Dutch Air Force at Soesterberg, near Utrecht, he was dreaming of a more peaceful use of the aircraft he saw around him: the transport of mail, cargo and even passengers. This, however, was something almost unheard of, and when Plesman discussed his ideas with his fellow-officers they merely laughed. But once the war was over, plans were made everywhere to use the now redundant bombers and reconnaissance aircraft as transports and the first air transport companies were founded. One of these, a British company, even asked for a concession to fly from London to Amsterdam; but meanwhile Plesman was very active and found some supporters for his plans. It was decided to organize an air display and exhibition in Amsterdam, to show the Dutch people how far aviation had advanced abroad. This display, "ELTA," proved to be an astounding success and the people of the Netherlands were converted into a high degree of airmindedness. A favourable atmosphere having thus been created it was quite easy for Plesman and his supporters—among whom was Gen. C. J. Snijders, Commander-in-Chief of the Dutch Forces—to raise the funds necessary for the foundation of a Dutch air transport company. This took place in The Hague on October 7, 1919. Albert Plesman was appointed manager.

All this, however, did not mean that flying was started immediately. It was not until May 17, 1920, that the first service operated by K.L.M. was inaugurated. On that day a converted D.H.16 (G-EALU), chartered by K.L.M. from Air Transport and Travel Ltd., flew from London to Amsterdam with Capt. H. "Jerry" Shaw as pilot. It carried two British journalists and a parcel of British morning papers. The return flight was made on the next day. This schedule was continued during the entire summer season, till October 31. Thenceforth services were temporarily suspended, flying in the winter season being too dangerous under prevailing circumstances. Meanwhile a service to Hamburg had been opened, in September, with chartered German machines and pilots, and the company had purchased its first aircraft—two converted D.H.9s and two Fokker F.2 airliners. With their enclosed cabin, seating four passengers, the latter were the last word in air transportation in those days.

The late Dr. Albert Plesman (left) with the man whose company built many aircraft for him—Donald W. Douglas

The next year saw considerable activity by the young company. Services were reopened on April 14. The first two Dutch pilots (Capt. G. J. Geijssendorffer and Capt. R. Hofstra) were engaged, return fares for air travel were introduced, and the first special air booking-office in the world was opened by K.L.M. in the centre of Amsterdam. Schiphol Airport, then a muddy field, shared with the air force and situated 13ft below sea level, got its first hotel-restaurant and a special aerial survey division was created by K.L.M. with the object of photographing large buildings and premises. The first of fourteen Fokker F.3s (an enlarged version of the F.2) were introduced. They seated five passengers and had a separate freight hold. The pilot, however, was still seated in the open, and he could only be contacted during flight by sliding a notice on a sheet of paper through a small hole in the bulkhead.

Flying was done with visual aids only, and if specific landmarks could not be seen from the air the flight was cancelled. The Amsterdam - London route led along the Dutch and Belgian coasts as far as Calais. From there the Channel was crossed to Dover, and the railway followed to London. When passengers complained that the trains below them were going faster than their aeroplane the pilots were ordered to fly exactly above the railway track. But thanks to the excellent qualities of the Fokkers the Dutch services usually proved to be more reliable than rival ones, K.L.M. aircraft often coming through when others remained on the ground.

In 1922 Brussels was added to K.L.M.'s network, and the company completed its first million kilometres in the air. For the first time services were continued during the winter months (1922-1923), passengers being supplied with rugs and footmuffs. Another proof of K.L.M. service was that the airport staff carried the passengers to and from the aircraft, thus saving them having to wade through the Schiphol mud. The next year saw Paris added to K.L.M.'s network, and in 1924 the first large animals —a bull and a pony—were carried by air. In the same year the Fokker F.7 was introduced, the first aircraft having two pilots and being equipped with radio. Eight passengers were carried.

The main entrance to Schiphol in the early 'twenties

The Flying Dutchman is Forty . . .

The first F.7 became famous in the same year for its flight from Amsterdam to Batavia (now Jakarta)—the first Dutch flight to the Far East. This proved that scheduled air services over long distances were possible and that an air route between the Netherlands and Dutch overseas territories could be a reality within a few years.

The year 1925 brought important "firsts" in the history of air transport. Introducing a new variant of the Fokker F.7, K.L.M. became the first airline to operate aircraft with air-cooled radial engines and metal propellers. A service to Copenhagen was started and in The Hague the company moved to new quarters. Its standard aircraft then was the Fokker F.7, seating eight passengers and powered by a 420 h.p. Bristol Jupiter.

In 1927 the first intercontinental charter flight ever made was executed by an F.7 chartered from K.L.M. by the American millionaire Van Lear Black. With two K.L.M. pilots it covered a distance of 18,710 miles on a return trip from Amsterdam to Batavia, the outward journey taking 13 days and the return 14 days. In addition many other flights were made by the K.L.M. crew with the same aircraft, all on charter to the American millionaire.

In the following year K.L.M. took on further flights to explore the air route to the Far East. Fokker had meanwhile produced his three-engined F.7/3m, and K.L.M. almost immediately utilized these aircraft on the Far East route. After a number of trial flights a scheduled fortnightly service was opened on September 12, 1929, the F.7/3m being used exclusively. Another new type adopted by K.L.M. was the twin-engined F.8 seating 15 passengers; it was mainly used on the European services.

A date worth mentioning is June 24, 1927, because on that day K.L.M. introduced the flight engineer as a new crew member; experience had shown that on foreign aerodromes the technical assistance given by local firms and agencies was often below a standard and thus it would be much better to carry their own engineers on board. Moreover they could do some useful work during flight, such as looking after the passengers and playing more or less the rôle of the steward(ess)—who did not exist in those days.

In 1929, when the company celebrated its tenth anniversary, the small enterprise had grown into a real business, operating a fleet of 20 aircraft with seating for a total of 192 passengers. It had just started to operate the longest scheduled air service in the world. During 1929 some 1,234,000 miles were flown and 15,690 passengers carried, as well as 1,547,900 lb of cargo and 172,000 lb of mail. The original staff of twelve had grown to 345.

During the next ten years the company gradually extended its activities. Many places within Europe were added to the network and the service to the Far East, started in 1929 as a fortnightly one, became weekly in 1931. In 1935 this frequency was doubled, and finally in 1937 it was flown three times weekly. The original schedule with the F.7/3m resulted in a 12-day journey on which 89 hours were spent in the air. The Fokker F.12 and F.18, introduced in 1931 and 1932 respectively, reduced this time to ten days and 81 flying hours. In 1935, however, the all-metal Douglas DC-2 enabled the schedule to be lowered to 6 days and 57 flying hours, while the introduction of the DC-3 in 1937 reduced the flying time again—to 55 hours.

In 1931 the company opened its first domestic service, between Amsterdam and Groningen. The distances in the Netherlands being short, and the country having an excellent rail and road network, the need for fast air services was very small. Moreover much time would be lost in ground transport between airports and cities on both sides of a route, this making the gain in time only marginal. Nevertheless, local interests in several parts of the country asked for fast air connections with Amsterdam, where connections could be made for destinations abroad. Consequently some domestic services were opened, in some cases as short-lived experiments, while others proved to be quite successful. There was, for instance, a service across the islands of the province of Zeeland to the Belgian seaside resort of Knokke; and this shuttle service, landing at Rotterdam, Haamstede and Flushing, was successful, road connections between these islands being pretty difficult and time-consuming. It seems curious that this service was never re-opened after the war.

Important changes took place in these ten years in the company's equipment. In 1929 this consisted almost entirely of Fokker aircraft, and remained so until 1934. Then great changes took place. In the U.S.A., Boeing, Douglas and Lockheed had introduced their all-metal low-wing airliners which proved to be such an improvement over their predecessors that Plesman decided to introduce this kind of aircraft as soon as possible. Fokker, when asked whether he could produce them at short notice, had to his regret to state that this would take some time—more time than Plesman would allow him. Thus Plesman turned directly to the U.S. manufacturers to purchase the aircraft he needed. Fokker meanwhile, as an answer to the new and fast Americans, had built his F.20, a three-engined machine with a retractable undercarriage and highly refined contours. With this aircraft K.L.M. intended to make a special Christmas mail flight to the East Indies in December 1933, flying an extra-fast schedule. At the crucial moment, however, the central engine was badly cracked and as repairs took too much time Plesman ordered the F.18 *Pelikaan* to take over. Although 25 m.p.h. slower than the F.20 this aircraft, piloted by Capt. Smirnoff, succeeded in maintaining the F.20 schedule under sometimes very adverse weather conditions; it flew to Batavia in four days and several days later returned in the same time.

The next year K.L.M. entered its first DC-2 in the London - Melbourne Air Race. This aircraft, *Uiver*, under the command of Capt. Parmentier, finished first in the handicap section of the race, flying the 12,350 miles between the two cities in 90 hr 17 min. This proved the excellent qualities of the Douglas airliner in such a convincing way that an order for fourteen more DC-2s was placed, three additional aircraft being ordered later. In 1935 the DC-2's successor, the DC-3, was also ordered by K.L.M., a total of 24 being delivered between 1936 and 1939. A few Lockheed Super Electras were also purchased.

K.L.M. had meanwhile extended to the western hemisphere. In December 1934 a specially modified Fokker F.18, called *Snip*, made the first flight between Amsterdam and Curaçao via the South Atlantic, the aircraft being flown by Capt. Hondong. This meant the start of scheduled air services between the various Dutch islands in the Caribbean area and Suriname. A second F.18 was later shipped by sea, followed by a twin-engined F.8. Later four Lockheed Super Electras were introduced, as the only other connections between the islands were by slow sailing-ships, air transport soon proved to be of great importance for these islands and their population, and thus the Caribbean network was gradually extended. Later, places outside the Dutch territory, such as Maracaibo, Baranquilla and Port of Spain, were also served.

The number of crew members continued to grow, and 1930 saw the introduction of wireless operators. Plesman, who once stated that he "did not need that junk in his aeroplanes," was now one of the first really to introduce it. The steward was added to K.L.M. crews in 1932, and he was joined in 1935 by his female colleague; K.L.M. being one of the first European companies to introduce this charming touch. Another important improvement was that from 1932 all flying and terminal staff of the company wore uniforms—a factor that contributed much to the standard

Below, arrival of the first aircraft from London—at Schiphol, on May 17, 1920. On the left of the picture is Albert Plesman, ready to welcome the first passengers. Centre, a Minerva Knight limousine was used for the transport of passengers between Waalhaven and the city of Rotterdam. Last, in July 1924 a bull was flown from Rotterdam to Paris

Far left, a slight mishap to a Jupiter-engined Fokker F.7

Immediate left, life-jackets are seen to have been part of the standard equipment on the Amsterdam-London route in the early years of K.L.M.

The Flying Dutchman is Forty . . .

of service offered by the company. Another novelty K.L.M. introduced was the creation of a medical service, its first task being the inspection of hygienic conditions along the air routes for the benefit of passengers and crews. Later it also was charged with the periodic vaccination of crew members and the supervision of the transport of sick and wounded by air when the company was called on in case of emergency.

The Dutch government had meanwhile opened up the possibility of young Dutchmen being trained as airline pilots from scratch. Up to then all K.L.M. pilots were recruited from the air force, and converted to airline standard by the company itself. But in the 'thirties a special course was started, pupils receiving their initial flying training at a civil flying school, while theoretical instruction was given at a merchant navy institute providing a special aviation course.

Thus came 1939, the year in which the company was twenty years old. Its fleet of aircraft now numbered 45, seating 724 passengers. The route mileage was 17,400 miles and 61 cities in 29 countries were served. In that year, 5,878,000 miles were flown and 98,311 passengers, 3,788,200 lb of cargo and 1,605,250 lb of mail carried. Staff numbered 1,940 men and women.

Meanwhile dark clouds began to gather over the company. The Second World War had begun and already one of K.L.M. aircraft had landed at Schiphol with its fuselage riddled with bullets from a German fighter. Many services had to be suspended and the ones still being flown could only be maintained under very difficult circumstances, such as radio silence, screened cabin windows and special air corridors, necessitating long detours. The service to Batavia now started in Naples, the Amsterdam—Naples leg having to be covered by train. And then the big blow came. On May 10, 1940, German bombs fell on Schiphol. The home base of K.L.M., developed in twenty years from a muddy field into a modern aerodrome with concrete runways and large hangars, was badly hit. The bombs destroyed 18 K.L.M. aircraft and 11 others were later seized by the Germans, 14 more being on the Naples—Batavia route and in Britain. Just before the Germans entered The Hague, Mr. Plesman contacted one of his closest collaborators, Mr. Versteegh, by telephone to Batavia. "Versteegh," he told him, "it's finished here. You take over."

There was, however, not very much left to take over. The Batavia service was continued for some time, first from Naples, later from Tel Aviv, till the Japanese attack on the Dutch East Indies finished it. Some of the aircraft flying this service were destroyed in Japanese air raids. From Britain, K.L.M. operated during the war a scheduled service between Bristol and Lisbon, under charter to B.O.A.C. The initially few DC-3 aircraft were later joined by three others. This important service was maintained under sometimes very difficult circumstances by a handful of men with a few unarmed aircraft. Nevertheless only one aircraft was lost, being shot down by German fighters in 1943. Services in the Caribbean area, however, continued to develop. The four Super Electras were later reinforced with two Lodestars, and in 1944 six DC-3s were added. Among places served were Ciudad Trujillo, Port au Prince and Miami. All services in this area were maintained during the war years without interruption. It was the only area in which K.L.M.'s activity continued to expand during those dark times.

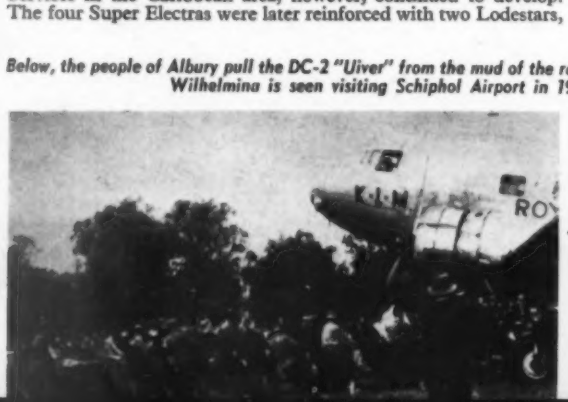
But when the war ended in 1945, the Dutch airline recovered so amazingly fast that it staggered the world. Immediately after the liberation of his country Plesman went to the U.S.A. to get aircraft for the re-opening of air services and he succeeded in obtaining seventeen C-54 Skymasters. As flying on the route to the Far East was still restricted for civil aircraft, the route to Batavia—re-opened in November 1945—was initially flown as a Dutch military air transport service, the aircraft having military roundels and service numbers. Gradually, however, they began to appear in the livery of K.L.M. when things became easier. At the same time several domestic services were started in the Netherlands, the heavy damage to railways and bridges and the lack of suitable vehicles making rail and road transport difficult. Originally D.H. Dominies were used, but these were later replaced by Dakotas, until, in 1948, normal surface traffic had sufficiently recovered to make the air services redundant. The first European service to be re-opened was the Amsterdam - Copenhagen route —on December 17, 1945, while in 1946 many other European cities followed. A large number of Dakotas were obtained from Allied war dumps and these, converted to airline standard, were used on K.L.M.'s European services.

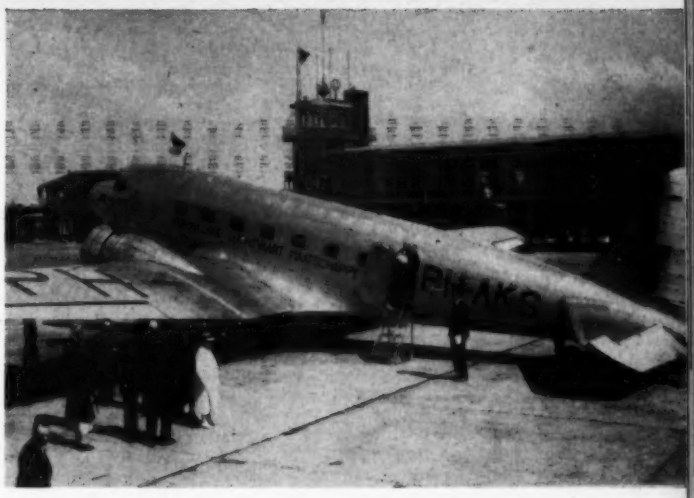
But Plesman aimed higher. On May 21, 1946, his company became the first in Europe to start a scheduled service across the Atlantic to New York, and on June 6 this was followed by a service to Curaçao *via* New York. August 6 saw the first K.L.M. flight to Rio de Janeiro and on October 6 a K.L.M. aircraft made the first flight to Johannesburg. To the fleet of Dakotas and Skymasters were added six Douglas DC-4-1009 aircraft and four Lockheed Constellations. For the first time in history K.L.M. operated at a profit, without any government subsidy.

In 1948 the company introduced two new aircraft types, the Douglas DC-6 and the Convair 240, and in the following year the first Constellations of the heavier L-749 type arrived. In that same year the company's new headquarters in The Hague were completed, the whole administrative staff and the management now being housed under one roof. Mr. Plesman (then Dr. Plesman) had meanwhile been appointed president. In 1949, on its 30th anniversary, K.L.M.'s route mileage was 70,385 miles, more than four times the pre-war figure; its fleet of aircraft numbered 78, seating 3,220 passengers. In 1949 the company's aircraft carried 380,900 passengers, 14,006,000 lb of cargo and 3,395,700 lb of air mail.

The year 1952 saw the introduction of the Douglas DC-6B and the opening of services to Mexico City and Santiago de Chile; and in that year tourist-class service was introduced on the North Atlantic route. Next year the first Super Constellations and Convair 340s and two Douglas DC-6A cargo aircraft were introduced. One DC-6A, specially modified to carry a large number of emigrants, took part in the London - Christchurch Air Race, finishing first in the handicap section and thus repeat-

Below, the people of Albury pull the DC-2 "Uiver" from the mud of the racecourse after an emergency landing. In the second picture H.M. Queen Wilhelmina is seen visiting Schiphol Airport in 1935, to inspect one of the newly arrived Douglas DC-2s





December 1933: The record-breaking "Pelikaan" arrives in Batavia

ing the glorious feat of the DC-2 in 1934. The distance of 13,063 miles was flown in 49 hr 57 min.

The importance of charters compared with scheduled traffic was underlined by the fact that in 1953 K.L.M. made its 3,000th charter flight since 1920. Both passenger and freight charters have from the very beginning received full attention from the company's management, and after the war they were even handled by a separate division. The result is that the company is frequently called on for all kinds of charters, ranging from flying a football team from Groningen to Maastricht to the transport of a group of sailors from London to Hong Kong. Among considerably extended cargo activities (K.L.M. has for years been a leading cargo carrier across the North Atlantic) the transport of animals, from ants to horses and elephants, takes a very important place. Several people have been trained as animal flight attendants.

A serious blow for K.L.M. was the death of Dr. Albert Plesman on New Year's Eve, 1953, at the age of 64. Through all the years during which he led the company it bore in a large measure the stamp of his imposing personality; and even now, years after his death, the spirit of Plesman is still alive. He was succeeded by Mr. I. A. Aler, before the war one of the company's pilots and later chief of flight operations, until, in 1930, he joined the Air Force. In 1953 he left the Air Force as its commanding general.

The year 1955 brought a K.L.M. decision of the greatest significance. A race was on to order jet airliners as soon as possible and the introduction of the first was envisaged in 1959. To remain in the lead, K.L.M. had to decide at short notice, and in October 1955 eight DC-8s were ordered from Douglas, K.L.M., being the first European airline to order American jet equipment. To enter the "jet age," nine Vickers Viscounts and two Fokker F.27 Friendships had already been ordered in the same year, while in 1957 the company's last piston-engined airliner, the Douglas DC-7C, was introduced.

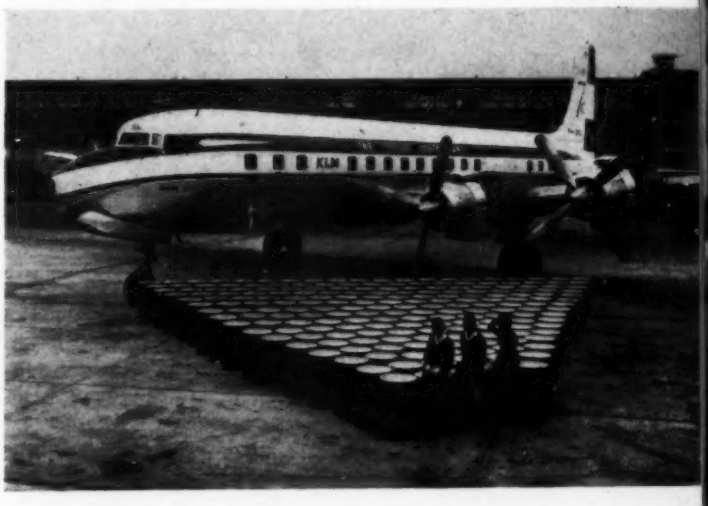
After long negotiations with the U.S. Government a service to Houston in Texas was opened on September 3, 1957, and the following year saw the opening of the company's polar route, *via* Anchorage to Tokio. This city, as well as Sydney, had been served by scheduled K.L.M. services since 1951, and thus the inauguration of the K.L.M. polar route meant that the company now had a round-the-world service entirely under its own flag. This around-the-world distance is 18,650 miles and it takes a DC-7C 72 hr 45 min to fly it. The company's oldest intercontinental route, Amsterdam - Jakarta, had to be closed down—as far, at least, as Jakarta was concerned—on December 3, 1957. Troubles between the Dutch and Indonesians had several times resulted in difficulties on this route, which remained very important as long as there still were Dutchmen in Indonesia. In 1949, for example, several countries in Asia closed their airfields to K.L.M. aircraft and the service had to be re-routed over Madagascar and the Cocos Islands. As the aircraft had to carry an additional weight of fuel only mail could be taken on these flights. In December 1957, however, the Indonesians took measures against K.L.M. as part of their action against the Dutch in order to obtain sovereignty over Dutch New Guinea, the last Dutch settlement in the Far East, which the Indonesians consider to belong to their territory. Thus a renowned air route, having a highly interesting history, had to be closed after having been flown for 28 years with only a few years' interruption during the war.

Now in its 40th year, the company has a route network of 168,000 miles and it serves 105 cities in 74 countries. Its fleet of aircraft numbers 91, seating some 6,000 passengers. It has a staff of 17,000 people, including 330 employees with more than 25 years' service. The flying staff is made up of 740 pilots, 400 flight engineers, 260 wireless operators, 400 pursers and stewards and 240 hostesses. Of these 18 have logged more than 20,000 hours, 62 more having 15,000 hours, while 372 others spent more than 10,000 hours on board the company's aircraft. Last year K.L.M. carried 941,000 passengers, 57,351,000 lb of cargo and 6,257,000 lb of mail.

Now for the future. K.L.M. intends to introduce the DC-8 jets—the original order for eight has meanwhile been increased to twelve—in the early part of 1960, the first aircraft being scheduled for delivery early in February. They will first be flown on the North Atlantic route, but later on other long-distance routes as well. A new engine overhaul shop has been built at Schiphol Airport with special facilities for the overhaul of jet engines and a large hangar will accommodate several of the giants simultaneously. The DC-8s will be flown in mixed-class configuration, seating 113 to 149 passengers. On the North Atlantic route the crew will consist of two pilots, an engineer and a navigator, the last being a pilot under training. On longer stretches, for instance the polar route, one more pilot or engineer will be added. K.L.M.'s last five DC-8s will have the new Pratt & Whitney JT3D turbofan engines. K.L.M. underlines the capacity of the DC-8 by two examples. In the first place they state that the twelve DC-8s will have the same capacity as a fleet of 45 DC-7Cs; secondly, they compare the DC-8 with the largest Dutch passenger ship, the *Statendam*. This vessel makes thirteen return trips a year across the North Atlantic, carrying 900 passengers on each single journey—an annual total of 11,700 passengers. One DC-8 with its capacity of 116 passengers will make 220 round trips between Schiphol and Idlewild, resulting in the transportation of an annual total of 25,520 passengers—more than twice the number carried by the ship.

In one respect K.L.M. differs from other European airlines, and that is in short-haul transport. Most European airlines have ordered smaller types of jets for this purpose or are intending to do so. K.L.M., however, sticks to the turboprop airliner for this type of transportation and has ordered a fleet of twelve Lockheed Electras, delivery of the first of which is now impending. Contrary to its original plans, the company will not use the Electras on shuttle services on the same routes as the DC-8. They will now mainly fly the routes to the Near East. Cairo and Damascus are scheduled to be first served: they will get their Electra service next December. These destinations will be followed by Teheran, Baghdad, Abadan, Khartoum, Dhahran and Tel Aviv, while in the spring of 1960 Moscow will get its Electra service. In next year's summer schedule the company hopes to fly to 16 places in the Near and Middle East with Electras.

This then has been the story of K.L.M., an airline founded forty years ago as a small private enterprise and still a private company, although it represents large Dutch national interests. Since 1957 its shares have been listed at the Amsterdam and New York Stock Exchanges after a successful issue. Its management has faced many difficult problems, and will continue to do so. Although its founder is no longer sitting in his office on the upper floor of the company's headquarters in The Hague, his spirit and vision are still alive among the men who continue his work. Going on in the spirit of Plesman they will make the right decisions at the right time and keep their company in the leading position it has occupied for forty years.



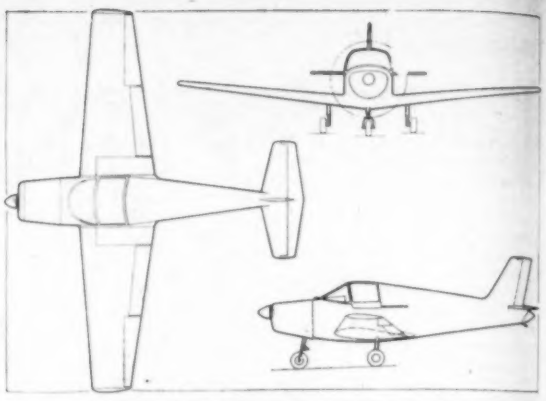
Fuel for a Polar-route DC-7C

Sport and Business

CHALLENGER IS THE NAME given by Ultra Flight of Sudbury, Ontario, to the side-by-side two-seat aircraft which they are putting into production. A three-view drawing appears on the right. Powered by a Continental 85 h.p. engine, the Challenger is reported to have a maximum cruising speed of 130 m.p.h. and a normal cruising speed of 115 m.p.h. Steel-tube and fabric construction is used for the fuselage and tail while the wing has two spruce spars and is fabric-covered. The fixed nosewheel undercarriage has oleo suspension. Ultra Flight are also producing components for the single-seat Skyhopper and offer full drawings of the Challenger for $75 (Canadian). The company is designing and expects to build a prototype of the Northerner, a four-seat gull-wing amphibian with two pusher engines, tip tanks and fixed floats.

QUANTITY PRODUCTION of the Tactair T-3 pneumatic autopilot has now begun at Bridgeport, Pa. The T-3 has been certificated for installation in all models of the Cessna 310 and is cleared for use without limitation at all heights and speeds, as well as for single-engined flight. Total weight of the Cessna 310 installation is 10.6 lb. The T-3 was described in *Flight* for April 12, 1957. It relies entirely on pneumatic pick-offs from panel-mounted horizon and D.I. instruments and pneumatic actuators operated from the aircraft vacuum system. The T-3 for a Cessna 310 costs $3,285 (about £1,170).

AN INTERNATIONAL AFFAIRS DIVISION has now been started by the American Aircraft Owners and Pilots Association and will be directed by Mr. C. S. Logsdon who for the past 20 years has been the official F.A.I. observer in the U.S.A. The A.O.P.A. counts 75,000 pilot members, 50,000 of whom actually own aircraft. Members are increasingly flying abroad, many of them crossing the Atlantic in light twins. A.O.P.A. is now considering affiliating with the F.A.I. and also establishing an entirely new international general aviation body. Equivalent organizations in Canada, Australia and South Africa received initial assistance and advice from A.O.P.A. and similar groups elsewhere are interested.



The Ultra Flight Challenger described opposite

PORSCHE ENTERED AN RW.3 powered by one of their Type 378/4 engines giving 75 h.p. in the international air rally of the German Aero Club, held between September 9 and 11. In a handicap race involving 2,230 miles' flying in 2½ days, landing at 31 airfields in Luxembourg, Holland, Belgium, England, France and Switzerland, the RW.3 won the second highest award. Some 75 aircraft from nine countries took part. The rally ended at Baden-Baden and the Porsche engine used only 62 Imp. gal of fuel, achieving about 36 m.p.g.

RETROSPECT

From "Flight" of October 2, 1909

Help for Coventry Flyers: As a further incentive to prospective Coventry aviators, and having formerly been a resident of the interesting old City of the Three Spires, I shall have pleasure in presenting to the first local builder of a practicable aeroplane a 6ft. "Hollands" propeller, of guaranteed highest efficiency, 10½ lbs. weight (with adequate strength), and of exceptionally good workmanship.—Yours faithfully, Sidney H. Hollands.

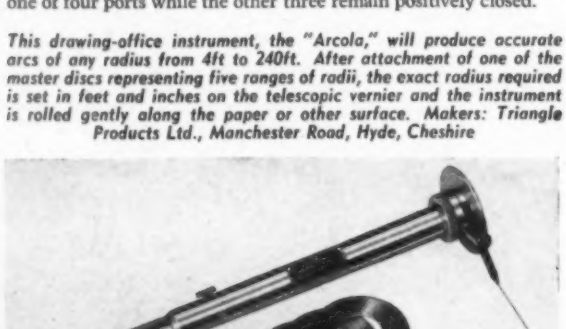
THE INDUSTRY

Selector Valve Designs

AMONG new products of Drallim Industries Ltd., who recently changed their address from Tylers Green, Godstone, to Station Works, Westhall Road, Upper Warlingham, Surrey, are fine-control and selector valves.

The former are designed to provide efficient flow-control of gases and liquids and a positive leak-free condition over a long operating life. Control and valve-operating stem are separated by a resilient diaphragm, and by the use of an adjustable stop each valve is set to provide an absolute seal without straining the operating handle or damaging the valve seat or sealing member. The valves, manufactured in three sizes (with ⅛in, ¼in and ½in diameter ports), are recommended for a wide range of uses at pressures varying from high vacuum to 200 lb/sq in. The ⅛in size has recently been adopted by the R.A.F. as standard for use when testing aircraft pressure-operated instruments. The selector valves are of entirely new design, providing a method of distributing gases and liquids between a number of independent or interconnected ports. A common inlet connector will distribute to any one of four ports while the other three remain positively closed.

This drawing-office instrument, the "Arcola," will produce accurate arcs of any radius from 4ft to 240ft. After attachment of one of the master discs representing five ranges of radii, the exact radius required is set in feet and inches on the telescopic vernier and the instrument is rolled gently along the paper or other surface. Makers: Triangle Products Ltd., Manchester Road, Hyde, Cheshire



Meeting Apprentice Needs

A NEW comprehensive scheme of courses and examinations, designed to meet the needs of all categories of craft apprentice employed in the aircraft industry, has been prepared by the City and Guilds of London Institute. It is designed for three years of part-time study and covers both production and maintenance sides of the industry; emphasis throughout is on basic craft practice, and the minimum requirements in associated subjects have been integrated with workshop practice syllabuses.

The new scheme (*Aeronautical Craft Courses*, 280-286) comes into force in technical colleges during the current session, and the first examinations are being held in 1960. Particulars may be obtained in pamphlet form from the City and Guilds of London Institute, 76 Portland Place, London, W.1 (price 9d., post free).

IN BRIEF

Available from Petroleum Films Bureau, 29 New Bond Street, London, W.1, is the current catalogue of their library of 16 mm and 35 mm films. Aviation subjects comprise 38 titles.

The Relay Division of Elliott Brothers (London) Ltd. is now in production with the Mercury wetted contact relays for which it has a licence from the Western Electric Co. Inc. of New York.

A new catalogue of the quick-action toggle clamps manufactured by F. Brauer Ltd. of Harpenden, Herts, illustrates over 100 types and/or sizes. A second brochure gives dimensional drawings and technical data.

The London area sales office of Northern Aluminium Co. Ltd. has been moved from Bush House to new premises at 50 Eastbourne Terrace, London, W.2. where the telephone number is Paddington 3281, and the telegraphic address Noralumin London.

Keelavite Hydraulics Ltd. have appointed Holman Bros. (Pty.) Ltd., P.O. Box 6218, Johannesburg, as their agent for the sale of hydraulic equipment in South Africa and Rhodesia. Holman Bros. are manufacturing hydraulic cylinders under licence from Keelavite.

CIBA (A.R.L.) Ltd., Duxford, Cambridge, have issued *How to Use Araldite Epoxy Resin Adhesives*, a well-prepared document outlining the applications of Araldite, describing the pre-treatment required before making the bond and also including numerous pointers towards achieving a good joint.

From Magnus Chemical Co. Ltd., Industrial Estate, Uxbridge, Middx. come details of recently introduced equipment for inter-flight spray-cleaning of aircraft; both portable and trolley-mounted models are available. Another product of this company is the Magnus Aja-Lif cleaning plant for engine and other aircraft components, as supplied to B.O.A.C.

Straight and Level

LAST week I had a telephone call from Sir Charles Boost, architect-designate of British supremacy in the air, who is making a strong recovery from the illness he suffered after over-indulging grouse and claret and cigars at a recent aviation function.

Evidently in a state of great agitation, he snapped: "Meet me at the Air Power Club at 8 o'clock," and before I could reply he rang off.

At the appointed time I found him, Gosport helmet and goggles in hand, moodily sticking pins into a wax effigy of the Planes Minister in the club's Brochure Room. "Thanks, I'll just have an aspirin and boiled water," was his reply to my greeting, and without further ado he pulled me into a mock-up of a leather sofa.

* * *

"Look, old boy," he began, "I'll get straight down to brass plasma-jets. Weeks ago I told my p.r.o. to suppress all these dangerous and misleading articles that are being printed about low air fares. He has failed utterly. Every paper I pick up, everyone I talk to, everywhere I go I suffer this lunatic rubbish about reducing air fares. I tell you, old boy, it's just about—"

"But Boosty—"

"Shut your cakehole. So I've sacked the fellow. Now what I want from you is this. You know the business. I want a p.r.o. who will set a supersonic fire raging round the world, who will tell people that for heaven's sake speed, speed, speed is what they need—and what this grand old country of ours must have if it is not to become an inferior air power, shorn of its prestige and with all its blue ribands lost to some Pan Yankee airline or other. I tell you, old boy. . . ."

At this point Sir Charles' words were rendered unintelligible by emotion. At length, the tears rolling pitifully down his cheeks, he sobbed: "Surely you can put me on to the right chap? Someone who believes in my cause? I'll pay him well."

● I wonder how many Farnborough-goers were puzzled by the fact that the Vulcan B.2 never trailed more than three plumes of smoke? The story goes that while the aircraft was based at the Aeroplane and Armament Experimental Establishment the Boscombe Down wives became highly disenchanted with its ability to make *all* their washing look less white than their neighbours'. Aware of the problem, Bristol Siddeley introduced a modification to the Olympus 201 which does away with the smoke entirely; but the sceptics at Woodford installed only one of the modified engines—in the No. 3 position. The photograph published on page 248 of the September 18 issue shows how effective the modification is.

● "The end of the Spitfire turned out to be so very nice and English you would think it was a stunt cooked up by *Punch*.

"Tea-time in the cricket match. . . . A crash landing on the pitch, wheels up, flaps down . . . the pilot, suave and unruffled, goes in to tea . . . the plane is dragged off. The match goes on.

"I particularly like the comment of the pilot, Air Vice-Marshal Harold Maguire, himself a Battle of Britain veteran. He said: 'I must admit I was a bit cross about pranging it.' "—from a story in the *Daily Herald*.

No sign of any King's horses or any King's men, which suggests that W/C. G. Turnbull has confidence in the indestructibility of his Humpty Dumpty as well as in his own balloon-jumping skill. He is seen demonstrating the sport at R.A.F. Biggin Hill on Battle of Britain day

● In the special Farnborough supplement to the *Imperial British Power Gazette*, Mr. Hugh Strangeways, Minister of Planes, is quoted as follows:—

"I have had drawn to my attention the recent formation of Air Union, which is some kind of merger of European airlines. What do I think about it?

"That is a very good question. But I will say with all sincerity—indeed with the collective sincerity of all my colleagues—that we welcome every move that leads to closer airline co-operation on the Continent, as this will be in the best interests of British air transport. We sincerely hope, however, that Air Union will not lead to closer airline co-operation on the Continent, as this will not be in the best interests of British air transport."

● Two eminent quotes on the subject of airline co-operation:—

"Airlines, like every other form of transportation, have found to their cost that uncontrolled competition is an extremely expensive luxury which eventually must be paid for by either the passengers, the governments concerned, or both."—*Mr. G. R. McGregor, president of T.C.A., September 1959.*

"Liberty is the right to choose what is good, what is useful, what is efficient, not what brings disorder to the community. We now have competition to such an extent that we wonder whether it still *is* competition. Too much of it leads either to confusion or monopoly. . . . We stand for sound and healthy competition, such as we see in the United States working smoothly under the supervision of the C.A.B."—*M. Max Hymans, president of Air France, September 1959.*

● If you got rather depressed when you heard how some of the Americans behaved themselves while Mr. Kruschev was their guest then cheer yourself up by reading Bob Whittier's article in this issue about The Great American Fly-In. This jolly jamboree attracted something like 800 private aeroplanes—all on one airfield. And even if you are constrained to write this off as vulgar exhibitionism (just as much of the rudeness to Kruschev must have been) you've still got to admit that there's hope for the Americans when you read how those same Fly-Inners—U.S.A.F. officers among them—got down to the unappetizing job of clearing up their litter afterwards.

I do hope that this symbolizes something.

● When I read the *London Gazette* announcement that three kings had been made honorary air chief marshals my eyes played a whimsical trick and I thought it said that three air chief marshals had been made honorary kings. Although I quickly got things back into focus, I still find the first idea immensely attractive. After all, there are lots of spare air chief marshals, and they'd probably do quite well as monarchs. The trouble is, though, there are even fewer spare kingships nowadays than there are company directorships.

● I am delighted to inform you that a recent Jupiter nose-cone was intended to place the following in orbit: 14 pregnant mice, two frogs, fruit-fly larvae, bread mould, human blood and skin, algæ cells, sea-urchin eggs, and onion and mustard seeds.

Unfortunately, the whole lot blew up soon after leaving the launching pad.

However, those concerned can turn for inspiration to the following advertisement in *American Modeler*: "24in rocket—solid fuel, high altitude performance, will carry living specimens, parachute return. Educational. Complete scale plans and instructions—only $1.00."

ROGER BACON

Free-hand

BY TWO ARTISTS WITH BALL-POINT PENS AND INQUISITIVE DISPOSITIONS

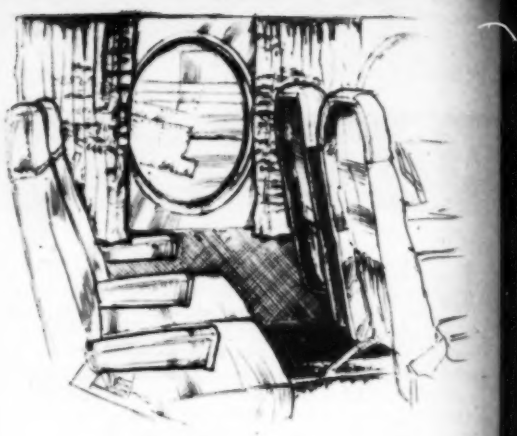
THERE is always something new at the Show, whatever the cynics may say; or if not new, then items that have not been illustrated before. We first visited the Rotodyne, and the rear fuselage, being newly furnished and impressively spacious, merited two sketches. Bowbeer tackled the 38½-lb-a-pair seats (by Aircraft Furnishings) **1** while Munger doodled the lofty rearward impression **2**. Deeply recessed seat-backs allow adequate knee-room at high-density pitch. In the equipment park we came across the simple control-panel of the Blackburn Palouste airborne air-starter trolley revealed. Nearly fifty of these units are in service with the Royal Navy **3**.

We walked over to the NA.39 (wish they would hurry up with a name) and were mildly surprised at the closeness of the blowing-duct to the leading-edge. Immediately aft of the slot is a row of rather long-chord vortex-generators—all shown in **4**. Folland's willing little horse now carries two, and requires a bigger tailplane. Very economically, this has been provided by moving the original Gnat unit outboard on a root extension **5**. On the Folland stand we later found the Trainer cockpit mock-up, with generous central windscreen to protect the rear-seat occupant during the ejection sequence **7**. Side by side stood the Lightning F.1 and the T.4 two-seater. A "quart into a pint pot" exercise we thought; so we did a paired sketch, roughly to scale, showing how the extra width has been achieved **6**. Sketch **8** was done as a commentary on the development of a "winner." The Argosy has grown twin rows of vortex generators on the steeply sloping cockpit fairing (also an underside flow-breaker on the beautifully fitted rear door to reduce tailplane interference).

We by-passed the queue for the Vanguard interior and rested long enough within to do **9**. Dimpled white plastic roof panelling is surrounded by continuous strip-lighting and accentuates the remarkable cabin width of B.E.A.'s new "ship." The Widgeon *avec balonettes* tickled the schoolboy side of our fancies, particularly when we found a certain amount of "knees-bend" provided for by a transverse damper on the front struttery **10**. We thought that the Hunter 66 Two-Seater had nothing new until we spotted the Dunlop nosewheel disc-brake with Maxaret **11**. The leg has been "beefed-up," as the braking effect is about equal to that of the tail-chute.

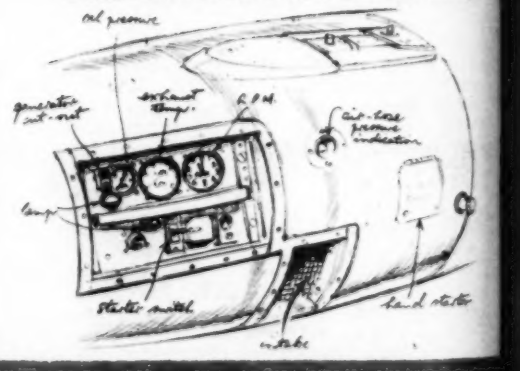
After a close screening procedure we got aboard the Comet 4B and found the four-abreast "Silver Wing" accommodation in the forward cabin: Lancefield chairs in "clerical-grey and coral" (maker's terms) fit pleasingly into this interior where "new" colours predominate. The curtain-frame and passenger service panels will slide on rails if the operator revises the seating-plan **13**. Comet passengers amidships have an interesting outlook **12**—intimate views of the thrust-reversal orifice with cooling intakes, perforated air-brakes and fuel dumping pipes on the trailing edge.

A pleasant and stimulating experience, this sketching at the Show—if you don't mind the inevitable whisper—"Spies."

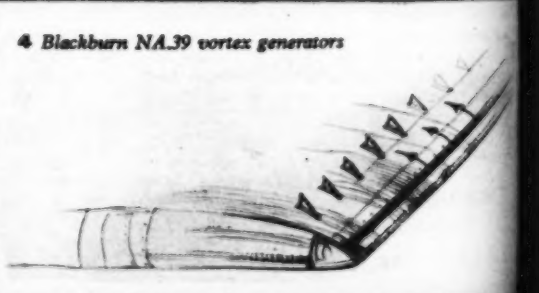


1 and 2 *Fairey Rotodyne interiors*

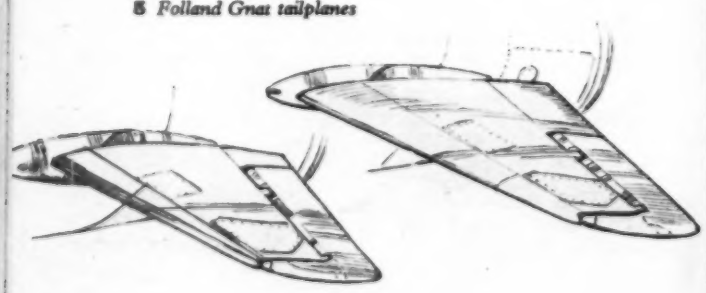
3 *Blackburn Palouste airborne air-starter trolley*



4 *Blackburn NA.39 vortex generators*



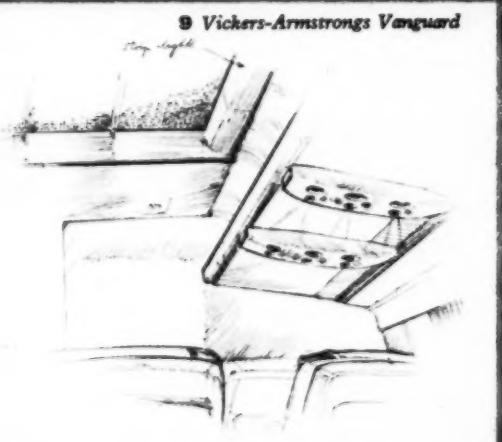
5 *Folland Gnat tailplanes*



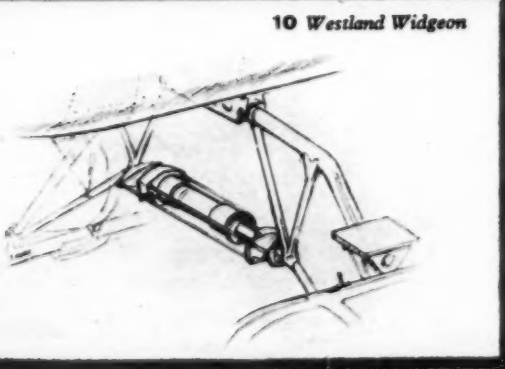
6 *English Electric Lightning T.4 and F.*

7 *Folland Gnat Trainer*

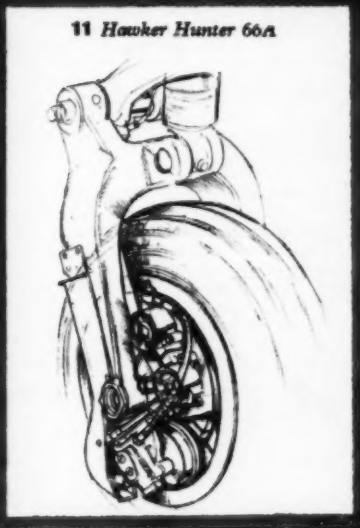
8 *A.W.A. Argosy*



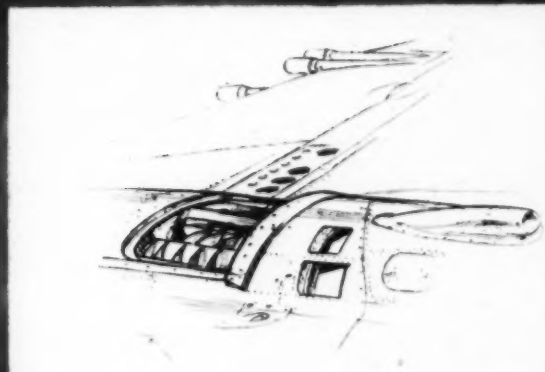
9 *Vickers-Armstrongs Vanguard*



10 *Westland Widgeon*

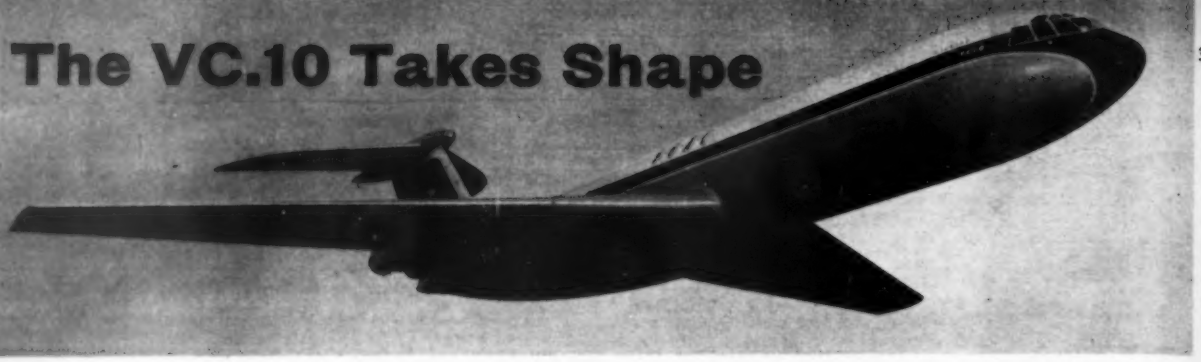


11 *Hawker Hunter 66A*



12 and 13 *de Havilland Comet 4B*

The VC.10 Takes Shape



AS is inevitably the case with any engineering project of similar magnitude, the Vickers-Armstrongs VC.10 jet transport is spending a long time in the formative stage. A three-view drawing appeared in *Flight* in January 1958, but this gives little clue to the hundreds of thousands of man-hours which are steadily being churned out behind the scenes at Weybridge and elsewhere in order to translate the concept into hardware. Now Vickers feel that the design has crystallized sufficiently to let a number of its major features become public.

As is now well known, the VC.10 (Vickers Type 1100) is being designed in collaboration with B.O.A.C., who have underwritten the programme by placing an order for 35. This is the largest single contract ever placed for any commercial aircraft (outside the Soviet Union, at least) and less spares is worth some £60m. Notes on the timing of the programme and of the stage so far reached appear at the end of this narrative.

In introducing this account of the engineering features of this remarkable design we cannot do better than quote the manufacturer:—

"When Vickers-Armstrongs (Aircraft) Limited began the design work on the VC.10 it could have pursued one of two main paths.

"It could have used the latest knowledge and the power development in the Rolls-Royce Conway engine series to produce a superior speed performance to that of first generation jets. Equally it could have applied the extra five years of knowledge to improving the safety margins, airfield performance and economics of the sub-sonic jet to much higher standards than hitherto achieved.

"In broad principle it was decided to concentrate on the airfield performance and economy of an aircraft which would cruise at 600 miles an hour.

"This objective has been attained by the design of a wing with good high-lift characteristics at low speeds and with low drag at high speeds. Wind-tunnel tests have given results which exceeded expectations.

"The engines are grouped at the rear of the fuselage so as to leave the wing clean and free of nacelles and mountings. The most effective use of leading-edge slats and trailing-edge flaps has thus been possible.

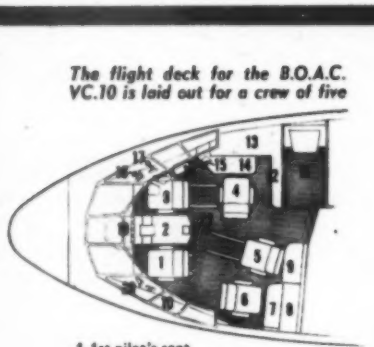
"Among the many extra benefits which result from this design is the noise and vibration reduction in the cabin. The fact that the jet efflux is clear of the structure also reduces maintenance costs and there is the safety aspect of low asymmetrical thrust in the case of engine failure. Other advantages are simple location of ramp equipment, with service and loading points at convenient working heights.

"Another feature of the VC.10 is the large low-pressure tyres fitted to the main wheels, with a pressure of 117 lb/sq in at maximum gross weight."

Powerplant. It is perhaps in the location of the engines that the VC.10 marks the most striking departure from the formula adhered to by the American big-jet builders. Some of the factors underlying the choice of rear-mounted engines have already been noted. There are, however, many other advantages, which can be summarized as follows: the clean wing gives maximum lift and minimum drag; full-span slats and flaps may be employed; in the normally critical case of failure of an outboard engine on take-off, asymmetric thrust is almost zero; even with excessive angles of roll the engines cannot touch the ground; blast on airport pavements is eliminated; the jet efflux cannot cause damage to the airframe; the intakes are afforded maximum protection from stones, slush and water; the engine turbines lie in a plane aft of the rear pressure-bulkhead and cannot harm passengers or any part of the fuel system; in-flight fires cannot spread to the fuel system or damage primary structure; the powerplants cannot be damaged in any normal wheels-up landing, and wing-tip dig-in is unlikely; during ground-running the intakes are well above the heads of ground staff; and, by no means least, noise and vibration within the usable portion of the fuselage are reduced to a minimum.

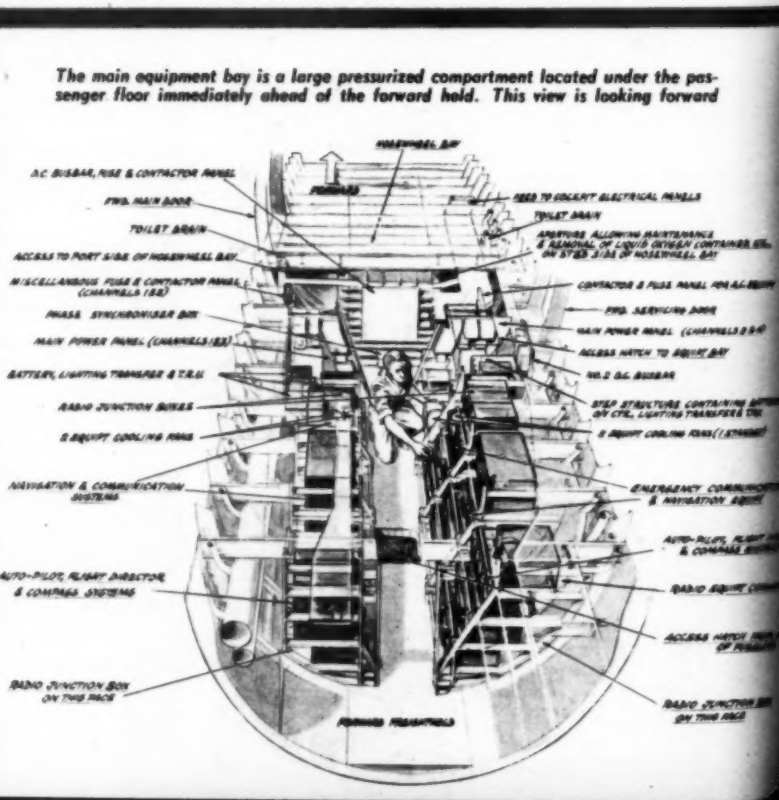
Design thrust of the VC.10 has not been divulged, but in view of the fact that existing units will be cleared at 18,500 lb and that Vickers speak of "the most advanced type of Conway chosen for the VC.10," it seems clear that each engine will have a dry rating

The flight deck for the B.O.A.C. VC.10 is laid out for a crew of five



1 1st pilot's seat
2 Control pedestal
3 2nd pilot's seat
4 Engineer's seat
5 Supernumerary's seat
6 Navigator's seat
7 Navigator's table
8 Console and stowages
9 Wardrobe (teleprinter below, hats above)
10 Side console (port and starboard)
11 Crew toilet
12 Electrical panel
13 Service ducting and engineer's stowage
14 Engineer's table
15 Engineer's throttles
16 Eyebrow windows (port and starboard)
17 Nosewheel steering (port and starboard)
18 Cloud warning (port and starboard)
19 Engine fire panel
20 D/v emergency window (port and starboard)
21 Sextant socket in roof

The main equipment bay is a large pressurized compartment located under the passenger floor immediately ahead of the forward hold. This view is looking forward

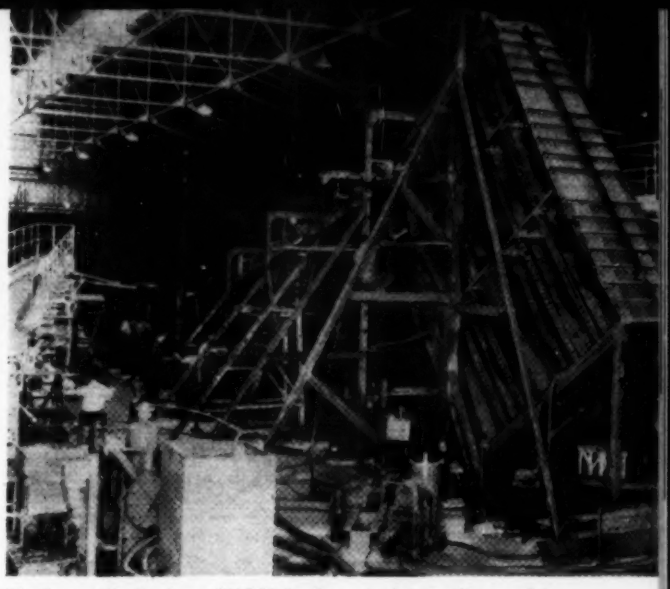

A.C. BUSBAR, FUSE & CONTACTOR PANEL
FWD. MAIN DOOR
TOILET DRAIN
ACCESS TO PORT SIDE OF NOSEWHEEL BAY
MISCELLANEOUS FUSE & CONTACTOR PANEL (CHANNELS 1&2)
PHASE SYNCHRONISER BOX
MAIN POWER PANEL (CHANNELS 1&2)
BATTERY, LIGHTING TRANSFER & T.R.U.
RADIO JUNCTION BOXES
E/EQUIPT. COOLING FANS
NAVIGATION & COMMUNICATION SYSTEMS
AUTO-PILOT, FLIGHT DIRECTOR & COMPASS SYSTEMS
RADIO JUNCTION BOX ON THIS RACK
NOSEWHEEL BAY
NOSE TO CG.
TOILET DRAIN
CONTACTOR & FUSE PANEL FOR A.C. BUSBAR
FWD. SERVICING DOOR
MAIN POWER PANEL (CHANNELS 3 & 4)
ACCESS HATCH TO E/EQUIPT. BAY
No. 2 D.C. BUSBAR
E/EQUIPT. COOLING FANS
EMERGENCY COMMUNICATION & NAVIGATION E/EQUIP.
AUTO-PILOT, FLIGHT & COMPASS SYSTEMS
RADIO E/EQUIPT. COOLING
ACCESS HATCH TO FORWARD HOLD
RADIO JUNCTION BOX ON THIS RACK
FORWARD FREIGHT HOLD

of around 20,000 lb. The powerplants will be removed by opening doors forming the underside of each nacelle; and although all four engines will have quiet nozzles, initially only the inboard pair will have thrust-reversers.

Airframe. It is fair to claim that no aircraft-manufacturing organization in the world can surpass Vickers' knowledge of large and fast aircraft. Massive airline experience with the Viscount and arduous operations with the high-subsonic Valiant, coupled with immense design effort on the V.1000 and Vanguard, have given the company the ability and confidence needed to tackle the huge task of designing the VC.10 airframe. Naturally enough, the structure is designed to fail-safe precepts, and multiple load-paths are allied with modest maximum stress levels. Like the Vanguard, the wing is based upon a multi-spar torque box forming an integral tank from tip to tip (see photograph). The centre section and inboard portions of this structural box consist of four spanwise spars, plate ribs with large access holes, and upper and lower machined skins. The outboard portions have three spanwise webs, and the rib perforations are much smaller. All ribs are essentially perpendicular to the leading edge. When assembled, this box behaves as four fuel tanks, the centre section acting as a transfer tank. A Thiokol medium is employed for sealing.

Full-span leading-edge slats and unbroken trailing-edge flaps are fitted. The former are in four sections on each wing and the latter in five, and all sections are actuated by jack-screws driven by spanwise torque shafts from inboard hydraulic motors served by duplicated 3,000 lb/sq in systems. The flying controls are surprisingly conventional. Yaw control is maintained by a three-piece rudder, each section of which is independently driven. Pitching control is accomplished by four electrically driven sections of elevator (any one of which at full runaway deflection can be neutralized by the remaining three), operating in conjunction with a variable-incidence tailplane driven by a hydraulic jack-screw. Lateral control is effected by four electrically driven ailerons and six hydraulically actuated spoilers; aileron and spoiler powers are nominally equal during cruise, so that loss of one of the ailerons would still leave six-sevenths of full control. The entire system is so designed that the aircraft may be flown on one section of each control only; and emergency power may be provided by a ram-air turbo-alternator and a ram-air turbopump. The autopilot system is a fully duplicated installation by Elliott Brothers.

It is appropriate to comment upon the design of the main passenger and servicing door. When shut it forms an effective plug to the cabin, being retained by aircraft structure and doorway-surround members. It may be opened from either inside or outside by moving a single large handle, which releases a pair of actuating feet, raises the door 3in and locks it in the raised position. It may then be pushed out between the retaining snubs and swung forwards (edge-on to any wind) and located snugly against the fuselage.



The largest single piece of VC.10 hardware to date is this complete wing box. Forming an integral tank, it is being used in tests on the fuel system; other specimens will prove the wing structurally

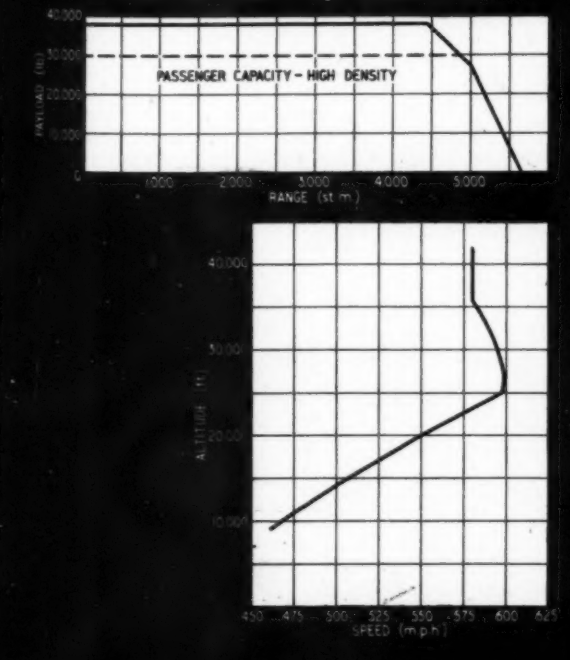
Underfloor Area. From front to rear, the vast space beneath the passenger floor is utilized as follows: oxygen and electrical services; retracted nose undercarriage; radio, electrical and auto-pilot systems; 535 cu ft forward freight hold; air-conditioning system; wing box; retracted main-undercarriage units; and the 815 cu ft rear freight hold. Above the rear hold is located the pressurization system, which fills the space immediately aft of the rear pressure bulkhead and extends up into the dorsal fin. With the exception of the tail stowage, all holds are pressurized and maintained at a temperature well above freezing under all flight conditions. Access to the holds is gained via large doors on the starboard side, hung from above and locked by pins at the sides only. When each door is closed it automatically drops into a self-locking position, and the fact that no contact is made with any part of the floor ensures that functioning cannot be impaired by dirt. The equipment bay ahead of the forward freight hold is pressurized and maintained at a pleasant temperature by cooling fans. Access to this bay may be gained from the ground or through a stairway from the forward vestibule in flight; and through it in-flight access may also be gained to the forward freight hold.

The Current Programme. As already noted, the VC.10 project has been based on the firm order for 35 aircraft placed by B.O.A.C. As is now customary, there will be no prototype; instead certification testing will be undertaken with the first production machines as they come off the line. From the outset the overall work has been based at Weybridge, although a substantial amount of detail design and manufacture has been assigned to the plant at Hurn.

Tunnel testing has already consumed more man-hours than that for any previous Vickers aeroplane. Five large models have been employed for investigations of lift at low-speeds and high angle of attack conditions generally. Other models have been used in additional low-speed investigations, and 18 major models have so far been required to meet the needs of the high-speed tunnel programme. Tunnel time already exceeds 2,000 hours, and in addition to five of the company's own tunnels, eight other wind tunnels throughout the country have been employed. Other programmes have involved research into ditching, intake performance, nozzle and silencer effectiveness and airframe de-icing.

A substantial amount of hardware can already be seen at Weybridge and Hurn. Jigs for the erection of the production fuselage, wings and tail unit are already installed and drawings are being released at a high rate. The first aircraft is scheduled to fly in the summer of 1961. Deliveries to B.O.A.C. will begin in 1963 and will continue throughout the following year and into 1965. Vickers state that deliveries to other customers can begin during the winter of 1963-64.

These curves illustrate estimated payload/range and (bottom) cruise performance. Assumptions are: i.s.a., long-range cruise, still air, one hour hold plus 250 st. miles diversion from wave-off and, for the cruise curve, 197,500 lb (the max landing weight). Cruise Much number at high altitudes is 0.88

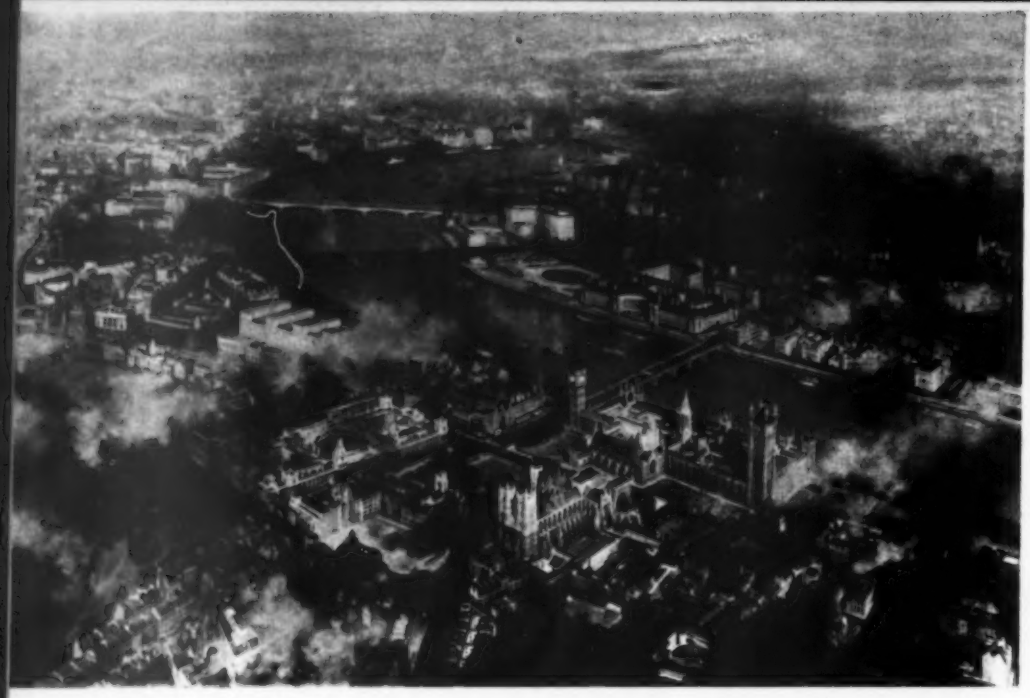


Now that the design of the initial version of the VC.10 has been completed it is possible to quote basic data with assurance. A brief specification was published in our issue of September 11; the following amplifies the data there given.

Dimensions: Span, 140ft; overall length, 158ft 10in; length of fuselage, 133ft 8in; height, 39ft 1½in; tailplane span, 44ft; wheelbase, 65ft 10in; track, between oleo centres, 21ft 3in; fuselage width (max), 12ft 4in; fuselage depth (max), 14ft 1½in; total pressurized volume, 7,850 cu ft (6,500 cu ft above the floor plus 1,350 cu ft freight holds); freight-hold depth, 4ft 7in; freight-hold floor width (max) 4ft 6in; height of passenger door cills, 10ft 6in; wing area, 2,800 sq ft.

Weights: Design gross, 299,000 lb; maximum landing, 197,500 lb; design payload, 38,000 lb.

Performance: See curves at left for cruise and payload/range performance; approach speed, 120 kt e.a.s. at 194,000 lb, 115 kt at 179,000 lb and 105 kt at 150,000lb; take-off distance (i.s.a., sea level, 1959 B.C.A.R., long-range cruise, average payload, reserves for 1 hr and 250 st. miles diversion from wave-off), 7,000ft for 5,000 st. miles sector, 5,800ft for 4,000-mile sector, 4,850ft for 3,000-mile sector, 4,150ft for 2,000-mile sector; landing distance (same assumptions) 6,150ft.



LONDON *David Shepherd*

THE SKY IS MY PALETTE

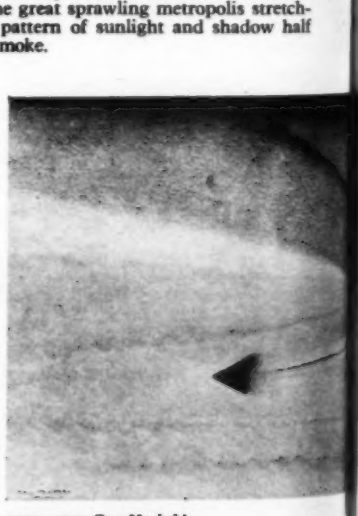
A group of well-known artists at the exhibition: l. to r. Frank Wootton, Terence Cuneo, Pamela Drew, Roy Nockolds and David Shepherd

INTRODUCED by Roy Nockolds (deputizing for the, as yet, unnamed president), Air Marshal Sir Edmund Hudleston, Vice-Chief of the Air Staff, opened the sixth Exhibition of the Society of Aviation Artists at Guildhall on September 22. Touching briefly on the difficulties of capturing the spirit of flying, he congratulated members on the way in which they had succeeded. In humorous vein he warned them, however, that within two generations the field might well be narrowed down to one of two alternatives—either still life on the ground or speed streaks in the upper atmosphere.

An extension to the main exhibition this year was also introduced—a selection from the first R.A.F. Art Competition. Appreciation was expressed for the helpful co-operation of the Society's members and their assistance in acting as judges. A. Egerton Cooper, R.A., then moved a vote of thanks to the Air Marshal and the exhibition was open.

Dominating this year's show by sheer size is David Shepherd's aerial view of London. A truly remarkable work, of infinite patience, it shows a view that may soon be familiar to all inter-city helicopter travellers—the great sprawling metropolis stretching away in an interesting pattern of sunlight and shadow half lost in a haze of dust and smoke.

THE REPULSE OF GERMAN PARACHUTISTS BY THE 2ND BATTALION, THE LEICESTERSHIRE REGIMENT AT HERAKLION, CRETE, ON 20TH MAY, 1941 *Terence Cuneo*



TIGHT TURN *Roy Nockolds*

ME AND MY SHADOW *Frank Wootton*

LANDFALL *Keith Shackleton*

Opposite, one's attention is drawn to a wonderful flood of colour as, lit by the rays of the dying sun, a solitary Viscount flies high before a piling background of rising cumulus in Frank Wootton's prosaically titled *Me and my shadow*. Farther along, full of vigorous movement and daring action, is Terence Cuneo's colourful painting showing the repulse of German parachutists by British soldiers in Crete. His superb sweep of execution excites the mind—the guns fire, the noise of battle sweeps across the countryside, and the parachutists swing down from the sky in unending succession.

Adjacent and in lonely contrast, *Anonymous Comet*, by Keith Shackleton, slides purposefully down and across a cold moonlit landscape. *Landfall*, also by this artist, is very attractive both in colour and brushwork. With the sun struggling to pierce through a mist-laden atmosphere, the waters surge and swirl around the base of the lighthouse standing bright red against a duller blue-green background.

Roy Nockolds deals with *Low-level Strike—the NA.39* with expected competence. Sleek and porpoiselike the aircraft arrows smoothly through wet laden clouds hanging low over a choppy sea. His *Tight Turn* is an attractive impression—a strong banner of light with a red core of energy, curving hard against a pale lilac void. *Battle Wings*, by Kenneth McDonough, is highly evocative and effectively portrays two flights of D.H.2s flying low over the French countryside during the first World War. And in almost a blue monochrome, *Lancaster J for Johnny Breaches the Moehne Dam*, by Arthur Sturgess, the aircraft is depicted coming away fast with baleful moonlight glinting on spinners and cockpit and, in the background, the vast wall of water gushing down from the crumbling walls of the dam.

LOW-LEVEL STRIKE—THE NA.39
Roy Nockolds

BATTLE WINGS
Kenneth McDonough

PIONEER *L. C. Bagley*

ENGLISH ELECTRIC "LIGHTNING" *Pamela Drew*

THE SKY IS MY PALETTE . . .

In bright sunlight, nearby, one Twin Pioneer skims over the Borneo jungle whilst another takes up passengers from a clearing overlooked by snowcapped mountains rising above the sloping line of a hill. Making a pair by the same artist—L. C. Bagley—*Pioneer* is bright and powerful, and in parts almost photographic in quality.

The unmistakable swirling brushwork of Pamela Drew is evident in *English Electric "Lightning"* as it climbs in an oily shimmer through blue-grey space. And in *Approaching Nicosia at Night* incandescent worms of warm light curl and writhe against a dark background in constant movement. An unusual approach by this artist is the use of burnished metal to provide the background for a tight-banking Spitfire in a picture bearing that title.

Lightning Display, by G. D. Coulson, is a vast explosion of power as the machine hurtles out of the picture with the runway receding fast in a blur of speed.

An interesting range of subjects is displayed by the Royal Air Force. From *Off-Duty Hours*, by Corporal Bone, strongly reminiscent of Stanley Spencer in treatment, and depicting airmen in civilian clothes flying model aircraft, to the well-handled free brushwork of *Fighter Pilot '59*, by Wing Commander Hoad, or to the *Social, Sergeants' Mess*, by Flight Sergeant Lusty, which one feels should have been called *After the Social*. *The Camp Cinema*, by Corporal Watkins, is very attractive in colour and composition, although the draughtsmanship is not quite all it might be. L. A/C. Street's *Duty Clerk* in pen and wash is very nicely drawn, as is *Portrait of an Airman*, by L. A/C. Gott, which is effective on a coarse scrim with colour coming through the wash. *Portrait of Flight Lieutenant Bold*, by Flight Lieutenant Carroll, is competently handled in modern treatment.

Altogether a vigorous and impressive show and one that can well be visited more than once. The exhibition closes on October 10.

R. E. MEDDEMMEN.

OFF-DUTY HOURS *Corporal Bone*

PORTRAIT OF FLIGHT LIEUTENANT BOLD *Flight Lieutenant Carroll*

FIGHTER PILOT '59 *Wing Commander Hoad*

SOCIAL, SERGEANTS' MESS *Flight Sergeant Lusty*

One of the English Electric Canberra B(1).12s for the R.N.Z.A.F. (last week's issue, page 285) on a test-flight near Blackpool piloted by S/L. H. Moss, who is to command No. 14 Sqn.

SERVICE AVIATION

Royal Air Forces and Naval Flying News

Honouring Three Kings

THREE kings—King Olav V of Norway, King Frederik IX of Denmark and King Gustav VI of Sweden—have been made honorary air chief marshals. These appointments took effect on September 15 and (as recorded in the *London Gazette*) "mark the close and cordial relations which exist between the Royal Air Force and the air forces of the three Scandinavian countries."

Future of Tengah

AT Singapore on September 19 the Commander-in-Chief F.E.A.F., Air Chief Marshal the Earl of Bandon, said that the R.A.F. base at Tengah on Singapore Island would soon be "the most important airfield in the Far East," built up to be comparable to Butterworth, the R.A.A.F. base near Penang. He said the 2,000-yd runway at Tengah would be extended to 3,000 yd, and added: "We are going to get modern fighters here. Meteor night-fighters with radar are coming and later Javelins. We may also get a squadron of Hunters." The C-in-C. said that the base would then be "fully operative by night and day."

The Earl of Bandon had been asked to amplify statements made four days previously by Air Chief Marshal Sir Thomas Pike, C.A.S.-designate, who told a Press conference at Singapore that Meteor night fighters were due there "next week." Sir Thomas had also said that it was possible Bloodhounds might be installed. The C-in-C. declined to add anything to Sir Thomas' statement about missiles, commenting only that no decision had been reached. He concluded by saying: "While we are responsible for the defence of Singapore we shall always have fighters on the island. Fighters and ground-to-air missiles—if employed—will always form an integrated part of any defence."

N.Z. Celebration

THREE Vulcans from No. 617 Sqn. are to take part in a display at the opening of Wellington Airport, New Zealand, on October 24. A Comet, Britannia, Hastings and Beverley of Transport Command will also participate, the force being under the command of the A.O.C-in-C., Air Marshal Sir Denis Barnett, who is making his first visit to his home country of New Zealand for 27 years. (The opening of Wellington Airport was referred to in our Air Commerce pages last week.)

Fledging the AEW.3s

AN Intensive Flying Flight for Gannet AEW.3s was recently formed by the Royal Navy at Culdrose and it is expected that the first operational unit will be commissioned at the end of this year. Up to now, seven production aircraft have been built, within a year of the first flight of the prototype; and these seven machines and the prototype have between them logged more than 500 hr flying.

The Gannet AEW.3, which is to replace the Skyraiders now being used by the Royal Navy in the airborne early warning rôle, is an entirely different aeroplane from its Gannet predecessors. It has been substantially re-designed, having only the tailplane and outer wing sections in common with the earlier marks. [An air-to-air photograph of a Gannet AEW.3, showing an underside view of the aircraft, was published on this page on September 18.]

IN BRIEF

The Earl of Bandon, Commander-in-Chief F.E.A.F. since July 1957, was recently promoted from air marshal to air chief marshal.

* * *

Mr. J. A. Boyes, headmaster of Kendal Grammar School, has been appointed director of studies at the R.A.F. College, Cranwell, in succession to Mr. Antony Constant.

* * *

No. 85 Sqn. is holding its fourteenth annual reunion on Saturday, November 14, at the Victory (Ex-Services) Club, 73 Seymour Street, London, W.2. Tickets (18s) may be obtained from J. Roberts, 60 Swanfield Road, Waltham Cross, Herts.

* * *

Nearly 50 ratings of the Fleet Air Arm, with two officers, are to go to the U.S. next month in H.M.S. *Adamant* to demonstrate the field gun drill for which the F.A.A. holds the record (a time of 3 min 09.8 sec) in the Navy's competition at the Royal Tournament.

* * *

A. Cdre. R. N. Bateson, who led the wartime Mosquito attacks on Gestapo headquarters at The Hague, Copenhagen, and Odense, became Assistant Chief of the Air Staff (Operational Requirements) from September 21 with the acting rank of air vice-marshal. He had been Director of Operational Requirements (B) at Air Ministry since December last year.

* * *

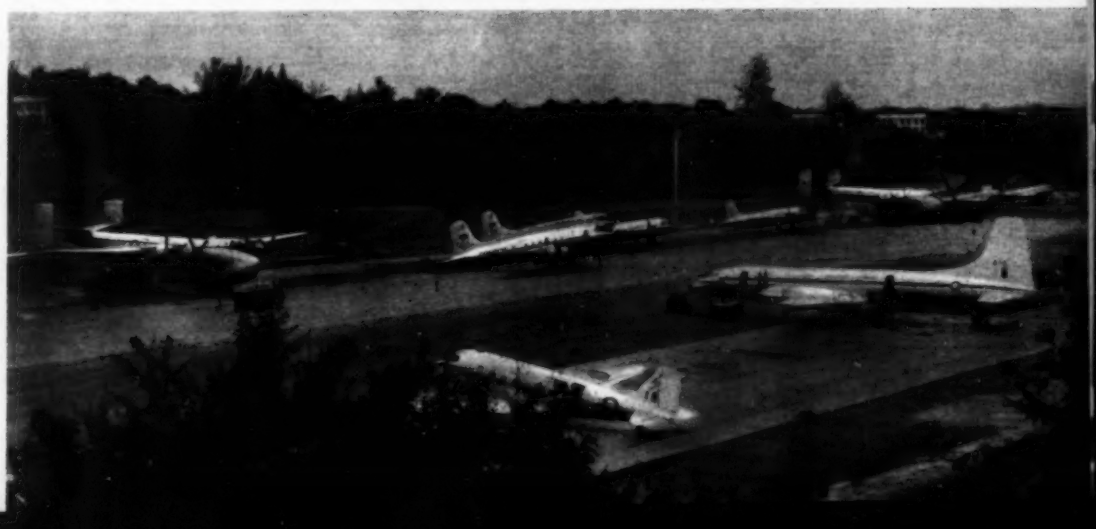
A. Cdre. A. Case, who has just completed the I.D.C. course, has been appointed Director of Operational Requirements (B) at Air Ministry. He was a test pilot at the time of the Battle of Britain, flying prototype marine aircraft on experimental flights. When a group captain, he commanded R.A.F. Nicosia in 1956, at the height of the troubles in Cyprus.

* * *

No. 74 Sqn., which has a tiger's head on its badge, is looking for a real tiger to use as a mascot and will be glad to hear from anyone with one to spare. The squadron is holding a reunion for all ex-pilots at its new station, R.A.F. Coltishall, on October 24. Further details may be obtained from the Adjutant, No. 74 Squadron, R.A.F. Coltishall, Norwich, Norfolk.

* * *

A reunion of No. 208 Sqn. (formerly Naval 8) Old Comrades' Association is being held from 6.30 p.m. onwards on Saturday, October 24, at the Swiss Hotel, 53 Old Compton Street, London, W.1. Running buffet; tickets 7s 6d each. Past and present members should apply for tickets as soon as possible to the hon. secretary, R. W. Booker, 28 Greet Road, Lancing, Sussex.



Oldest and latest R.A.F. transport aircraft seen together recently in the daily servicing section at R.A.F. Changi, Singapore. On this side are a Dakota and Britannia; and on the far side of the disused two Beverleys, two Hastings, two Valettas and two Dakotas

ELECTION PLATFORM (continued from page 315)

done, under general international agreement, to keep down air fares during a time of world inflation.

Fare policy is not an appropriate subject for party election manifestos, but some points might be made here. Firstly, any form of transport is most economical when an efficient vehicle has a high load-factor and a high rate of utilization. Greater competition and duplication of services along any one route is not the best way to secure these two pre-requisites of economic (and low cost) operation. This can be said with greater emphasis when the vehicle concerned has such a high initial capital cost as a modern aircraft. Secondly, the argument for applying low fares to a particular technical principle, i.e., a turboprop as against a turbojet engine, seems very dubious indeed and smacks more than a little of Luddism.

On the other hand, there is an unanswerable case for a lower class of air travel, based on some formula other than one which packs ever more passengers into the square yard. Consideration of this problem must progressively take into account the sensible utilization of aircraft (whatever the type of engine) which are fully amortized, reasonably comfortable and capable of carrying low-fare passengers quite safely if more slowly.

Without talking of breaking up (or breaking away from) I.A.T.A., there does seem a case for that body taking a deep breath and reconsidering its position—and maybe its unanimity rule on fares policy. The prospect of the development of low-fare cabotage services operating on stages as an alternative to internationally agreed routes must surely be an inducement to I.A.T.A. to carry out a re-appraisal.

Though the Labour Party unequivocally relies upon the air corporations as its main instruments for the development of air transport, it has always acknowledged that the smaller, independent, more personal concern had a contribution to make in such fields as charter work, seasonal tours, feeder services, freighting and such specialized operations as car-ferrying. Where such operations are licensed the operator has every right to expect proper security in the holding of that licence. The Labour Party would favour, in addition to a system of licensing for given services, a general carrier's licence to be granted to operators conforming to an enforceable code of safety regulations.

On the aircraft construction side of aviation Labour has stressed the need to sort out the facts from the propaganda and the security veil. Accordingly it proposes that there should be a thorough-going, authoritative and independent inquiry into the present pattern of the industry and its relationship to the Government. One of the questions which such an inquiry must settle is the terms on which future financial assistance is made available to the industry. If Britain is to keep in the aircraft business then clearly we cannot cheesepare on research and basic development, and inevitably this means that the State must find most of the cash. Whatever may be the feasibility of bringing a supersonic airliner into commercial operation within another decade (and many hold doubts similar to those expressed by Lord Brabazon), nevertheless one cannot draw a line in research and say "this far and no farther." A decision about a civil supersonic machine must be taken with this attitude to research.

A Labour Government would undoubtedly need to make different arrangements for ensuring that further public monies advanced to private firms are (a) spent prudently and (b) bring back to the public purse a fair share of any financial returns. The present arrangements cannot be considered satisfactory to the State—or fair to the tiny minority of firms who have made, as a commission on their sales, a net repayment to the Ministry of Supply.

The merging of aircraft firms into one big publicly-owned concern is not an idea which finds any serious acceptance. A financial holding in those companies which are supported by Government orders and development grants is, however, a proposal which has merits and which must be considered.

Sir Arthur Gouge Retires

A NOTE circulated by Sir Arthur Gouge to "all his old friends" has announced his retirement. He has been vice-chairman and chief executive of Saunders-Roe Ltd. since 1943, was president of the R.Ae.S. from 1942 to 1944 and of the S.B.A.C. in 1945, later becoming S.B.A.C. deputy president (1946-47 and 1947-48). He was with Short Brothers from 1915 until he joined Saunders-Roe, being responsible for the design of all Short aircraft between 1926 and 1943, for example the Singapore, Calcutta, Sunderland, Empire Boat, Stirling and (with the late Maj. Mayo) the Mayo Composite.

Aircraft for the Army

FOR at least a year the War Office have been evaluating various types of aeroplane for the British Army. A sturdy 5/6-seater is required, with the ability to operate from unprepared fields and small enough to be readily concealed. Total procurement would probably amount to some dozens of machines, and it has been reported unofficially that the delay in reaching a decision is now likely to influence the placing of the order; in fact the contract appears likely to go to whoever can guarantee delivery of the required number of aircraft within a given time (say, one calendar year).

Likely contenders appear to be: The Scottish Aviation Prestwick Pegasus, a variant of the familiar Pioneer, fitted with a 640 h.p. long-stroke Alvis Leonides; the D.H. Canada Beaver, made in Toronto and powered by the Pratt & Whitney R-985; the de Havilland Beaver 2, made at Chester and powered by the Alvis Leonides; and the Dornier Do27, made by Dornier-Werke and/or Blackburn Aircraft, and powered by a Lycoming GO-480.

Peace Through Air Transport

"UNLESS mankind can anchor its knowledge to modern principles, science may turn out to be not a guide, but the betrayer of humanity." This was the theme of the Institute of Transport's sixteenth Brancker Memorial Lecture, delivered in London on September 14 by the chairman of Eastern Air Lines, Capt. Eddie Rickenbacker. With aviation development in the hands of men of goodwill, however, we had "the one instrument which can forever eliminate the barriers of time and distance, of ignorance and misunderstanding which, since time began, have set men apart from and against each other."

For the future, Capt. Rickenbacker predicted atomic-powered fighters and bombers cruising 50-250 miles above the earth, forming a "perpetual peace patrol." As man developed his ability to engineer terrible instruments, "the need for them will diminish proportionately." Jet transports of 2,500 m.p.h. would lead to hypersonic atomic-powered airliners, "far more efficient aircraft" which would reduce costs for the travelling public and the shipper.

NEWS IN BRIEF

During the first flight under rocket power of the North American X-15, on September 17, a speed of over 1,300 m.p.h. was reached at 50,000ft; pilot Scott Crossfield reported complete satisfaction.

On October 6 the Bristol 192 helicopter is to perform its first commercial task. It will lift into position, for the Cavendish Laboratory of Cambridge University, a parabolic aerial for a radio telescope.

A Scottish Aviation Twin Pioneer and Prestwick Pioneer left R.A.F. Benson on September 23 for Malaya, where both aircraft are to join squadrons of the Royal Malayan Air Force. The delivery flight was being led by A. Cdre. N. C. Hyde, who is A.O.C. the Malayan Air Force.

The fourth annual Test Pilots' Forum—inaugural meeting of the London Society of Air Britain's 1959-60 season—will be held on October 7, at 7 p.m., at Caxton Hall, Westminster. It will be preceded by several films; visitors are welcome.

Holland is the first European country to have Sidewinders in operational use—fitted to Sea Hawks of the Royal Dutch Navy, whose personnel have carried out the necessary modifications on the aircraft. Two squadrons (one aboard the *Karel Doorman*) are to be so equipped, and the Netherlands Air Force is also to use Sidewinders.

The U.S. Department of Defense terminated the North American F-108 Rapier intercepter programme on September 23. Total investment at cancellation was over $150m and termination awards may amount to a further $50m; but aggregate savings during the next four years may amount to $240m (see leading article in this issue).

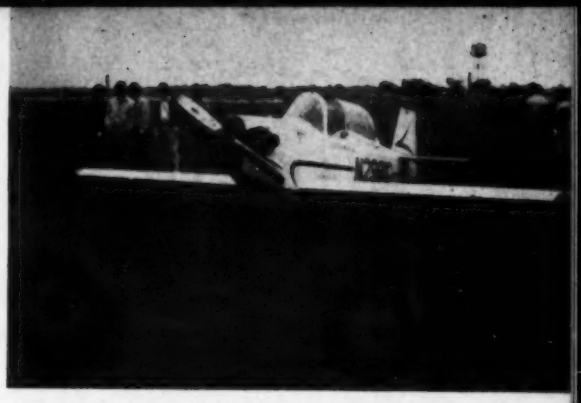
According to Dr. William Thaler, the U.S. Navy have developed a radar system which can detect nuclear explosions or the launching of a large missile thousands of miles beyond the horizon. A high-frequency ionospheric back-scatter system, it operates by reflecting electromagnetic radiation off the ionosphere and off the ionized gases from the target under investigation.

In our May 15 issue a photograph was published of the new lecture-theatre designed for the Royal Aeronautical Society as an extension to their headquarters at 4 Hamilton Place. At a meeting of the Society's Council on September 24 it was agreed that an immediate start should be made. The contract has been awarded to Holland, Hannen and Cubitts; work is now beginning and will be completed inside a year.

Next Wednesday's (October 7) issue of our associated journal *Amateur Photographer* will be a special Lighting and Flash Number.

ELECTRONICS IN THE AIR

Next week's issue of "Flight" will be a special number with AVIATION ELECTRONICS as its theme. Feature articles will review developments and trends in this rapidly expanding field, which now extends far beyond that of navigational aids. Regular features will also be included in this enlarged issue.



Something old, something new: Above, Allen Rudolph's Pietenpol Air Camper, built in 1934 (the fuselage still has the original unbleached muslin covering). The low-wing job is the all-wood Jupiter which carried off the Outstanding Design trophy

Another Successful Fly-in

By BOB WHITTIER

THE Seventh Annual International Fly-In of the Experimental Aircraft Association took place at Rockford, Illinois, from August 6 to 10, and was universally acclaimed as the best yet. Although overcast and thick haze prevailed over much of the midwestern part of the United States, eighty home-built and antique aircraft found their way to Greater Rockford Airport along with approximately seven hundred production types flown in by non-building members.

Rockford was chosen in preference to Milwaukee for a number of reasons, such as a better show of enthusiasm on the part of local potentates; more adequate field area; less densely populated surroundings and, above all else, much better accommodation for both visitors and exhibits. Starting near the huge Ozark Airlines hangar, a fence rambled around nearly half the airport's long perimeter, and amateur-built aircraft were parked some fifteen feet behind it. The public had ample opportunity to see the machines close up; yet the aircraft were better protected from the curious. The line-up stretched nearly a mile along the fence.

The Ozark maintenance hangar measures about 125 by 300ft, and nearly half of this vast area was placed at the disposal of E.A.A. It was therefore possible to set up several rows of bulletin boards on which various chapters pinned up material detailing their activities. A number of small aircraft in process of construction were also displayed, and suppliers of kits and materials had exhibits of their products. It was possible to conduct meetings, show motion pictures and give lectures without crowding; and the activities which were scheduled contributed greatly to the meeting's success.

Forums were held on several subjects, such as rotorplanes, structures, regulations, amphibians, aerodynamics and so on. Dr. August Raspet gave his now-famous annual lecture, again dealing with performance and efficiency. The association was honoured in having two distinguished guest speakers. One was Fred E. Weick, designer of the Ercoupe, noted aeronautical engineer and currently a research man for Piper Aircraft's agricultural airplane division. Mr. Weick gave a most interesting illustrated lecture about some of the development projects he had been associated with during his years as a designer. The second guest was Col. Roscoe Turner, whose air-racing fame should be known to most readers of this magazine. Col. Turner, in company with Mr. Steve Wittman, another air racer from "way back," did the honours in presenting trophies and awards and gave quite an enthusiastic little talk about the value and significance of the Experimental Aircraft Association's work in stimulating aviation interest at grassroots level. With over seven thousand members today, it can truly be said that E.A.A.'s growth has been phenomenal.

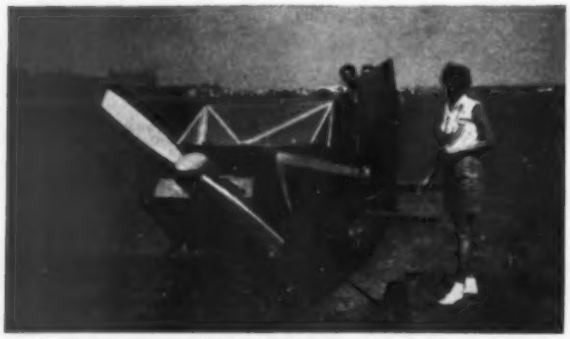
This reporter feels impelled to comment upon the obvious enthusiasm of the group's members. Volunteers from towns ten miles and ten hundred miles away pitched in with gusto to set up displays, man field committees, handle traffic and perform the task of cleaning-up the grounds after some thirty or forty thousand spectators had gone home. In the late afternoon of the last day a prominent F.A.A. official, a well-known engineer, an Air Force captain and a number of other E.A.A.-ers who might have been truck drivers, patternmakers or mechanics were to be seen industriously picking up rubbish and loading it on a truck. The airport manager, who had never before been host to so large a crowd, had been sorely worried about the clean-up job his men would be faced with and was dumbfounded at the job E.A.A. did for him. The local police chief, who had been a little suspicious that an outfit involved with home-made airplanes might turn out to be composed of characters similar to motorcycle cowboys, was quite impressed with the serious, orderly, yet friendly conduct of the membership. And, of course, it must be recorded that once again not one airplane suffered so much as a scraped wing-tip or broken tailwheel. Since Rockford handles several Ozark Airlines flights daily, the traffic problem was of some concern. One DC-3 pilot radioed the tower: "I feel like a goose in a flock of sparrows!" However, there were no accidents.

Other morsels are worth retelling. There was Rev. John W. MacGillivray, an R.C.A.F. chaplain at Summerside, Prince Edward Island, who had toyed with the idea of flying a Tiger Moth to faraway Rockford in order to see for himself what a Fly-In was like, but had dismissed the notion as being just too weird. Well, finding himself on vacation in August, he cranked up old CF-IVO to fly some 91 miles for a visit to Fredericton, N.B. The weather was good, the Gipsy purred on and on contentedly, and lo and behold, CF-IVO just seemed to want to go on and on,

On the left is Donald Nordsving's Pietenpol with 65 h.p. Lycoming engine ("flies like a Cub"). The dismembered Turbulent belongs to Joe Mathias and Warren Carter of Virginia (twenty coats of dope on wing, epoxy paint on fuselage, and modified boat-trailer for transport)

"Supersonic" styling: l. to r., the tails of Chris Smith's modified Stits Playboy, Ray Hegy's midget biplane, and a modified Cougar

ANOTHER SUCCESSFUL FLY-IN . . .



Mr. and Mrs. Leonard Eaves' folding-wing Cougar from Oklahoma

and Father MacGillivray seemed unable to do anything about it until he and the old Tiger taxied up to a stop between a Baby Ace and a Flut-R-Bug at Rockford. Then there was the letter in feminine handwriting which came to the hand of E.A.A. president Paul Poberezny. It was from a Californian mother whose boy, aged 16, had just obtained his private pilot's certificate and, lacking an airplane, had set out to reach Rockford by hitch-hiking. Would Pres. Poberezny kindly keep an eye out for the lad and do anything possible to assure his well-being? And, of course, there was Arnold Quarton, who had found a compass and charts adequate to navigate his tiny sixteen-foot wingspan Mong Biplane over the high western mountains and vast deserts from the same state. Or the letter from the naval architect in Bombay, who had been collecting vacation leave for some time and begged permission to talk with Mr. Poberezny for a few hours after making a contemplated trip to E.A.A. headquarters in the latter's basement in Hales Corners, Wis. And the "twin" Baby Aces, painted exactly alike!

The flying machines, as usual, appeared in all sizes and shapes. If any trend could be noted, it is that more small, fast aircraft like Wittman Tailwinds, Nesmith Cougars and Stits Playboys had been built than anything else. It appears that most of the homebuilt planes which actually take to the air are still being built by knowledgeable chaps regularly employed in the aircraft industry, who have the skill to weld steel-tubing, form sheet-metal to nice shapes, and bring hot little monsters down to a gentle landing. However, it is obvious that a sizeable proportion of members having less aeronautical background are hungrily studying ways and means of becoming airborne in simple, forgiving aircraft. This must be so, to judge by the several exhibits of uncompleted all-wood aircraft and the very careful attention which they received. Americans are waking up to the merits of all-wood construction but, having had little experience with it in commercial aircraft, are a trifle uncertain about using it in amateur aircraft at this stage.

A form of amateur aircraft called the Bensen Gyrocopter has for some time been suffering from adverse publicity arising from a series of mishaps involving everything from shattered rotor blades to shattered bones. Some men say the machine is bad, while others say the pilots are to blame. E.A.A., wishing to let experimenters speak for themselves, suggested to Igor Bensen that he attend the Fly-In and say what he wished about his brainchild. This he did. In ground forums and in airborne demonstrations he gave a rather impressive account of his gyroplane's abilities. To the assembled airplane-men the sight of Bensen swooping and banking about the field in his noisy flying chair was a bit upsetting . . . one felt that riding in the rig must be like flying in a 1910 Curtiss Pusher, with wind in the face, coveralls flapping madly, and "no visible means of support" to give any feeling of reassurance. Doubtless the craft is great fun, and if built in accordance with Bensen's specifications should be mechanically safe. Such mishaps as have happened appear to be due to a complete lack of piloting experience with the type. For the homebuilder, the autogyro could be a more feasible approach to the small-field, low-speed aircraft than either the VTOL airplane or the helicopter, and E.A.A. feels that there is no point in discouraging people from developing the Bensen idea. The answer, accordingly, is to help educate people in handling Bensens.

There is obviously a growing interest in small airplanes which can be driven or towed on the highway and stored in garages or barns. One can expect to pay thirty to fifty or more dollars per month to hangar a private airplane at many commercial airports —which can be most painful to contemplate.

Present was the Player Sport, a little detachable-wing parasol which had been trailered in from Utah. A Turbulent, sporting an exquisitely smooth twenty-coat dope and epoxy paint finish, came in from Virginia on a small boat-trailer adapted for the purpose. The Bryan Roadable flew in from Michigan, folded in wings up and over its pusher propeller, and buzzed down the highway to the Rockford City Hall to open the Fly-In officially. From Oklahoma came a Cougar and a Playboy, both with simple wing-folding schemes which permitted towing on highways.

The E.A.A. design committee will, as of this time, definitely be judged in 1960, and enough entries are under construction to make the affair worth looking forward to. About half the required prize money has been raised and E.A.A. officials must work fast to assure that the goal of $5,000 is reached.

Customary flight competitions, business meetings, elections and dinners were on the schedule and, together with the interesting aircraft and exhibits, the spacious and adaptable venue and countless little knots of men avidly talking airplanes, went to make the 1959 Fly-In altogether a most enjoyable and profitable experience for everybody. E.A.A. has indeed come of age, and is making the sportsman pilot's voice heard with growing volume and clarity.

Left, Model A Ford engine in Rudolph's aircraft. Right, Hegy's sports biplane from Texas. Last is one of several Bensen Gyrocopters that showed up. In the background is a Smith Miniplane, from California

Airliner Census

OCTOBER 1959

THIS third edition of *Flight*'s Airliner Census reflects the transition to the jet age in the addition of the Caravelle, Electra and Friendship to its contents and in the lengthening lists of operators of older, piston-engined airliners. But quite a few fleets of Convair 240s, DC-6s and L.049 Constellations formed a decade ago are still virtually intact: as yet the big jets have not precipitated an avalanche of such equipment on to the second-hand market.

In certain instances (i.e. the 707, Electra and Friendship), where a rapid rate of production for several airlines at once makes it difficult to present up-to-the-minute information of the aircraft actually in use, the total number on order is given, even though delivery of these is not yet complete. In all cases figures in parentheses refer to aircraft ordered but not yet delivered. In certain cases, where airliners have been converted to a later model (i.e. K.L.M. and Lufthansa Convair 340s to Metropolitans, Iberia L.1049Es to L.1049G standard), they are listed under their original types.

A break and short rule in each column denotes regional subdivisions. From the Commonwealth section to page 339, America is divided into "North" and "Latin" and "Elsewhere" covers the M.E., Africa, Asia and Australasia. An asterisk indicates that the carrier concerned is not certificated, and a blank space against an airline means that the number of aircraft owned is not known. The letters (FS) after a number indicate that the aircraft in question are known to be up for sale.

This edition is an extensive revision of that published on November 21, 1958, and a great effort has been made to maintain a high standard of accuracy. Perfection in a compilation of this kind is, however, unattainable; and we hope that readers will continue (as they have done in the past) to suggest deletions and additions.

N. and S. America	Europe	Mid-East and Africa	Asia and Australasia
AIRSPEED (now DE HAVILLAND)			
AMBASSADOR: No. built 21, in airline service 3.			
	BKS 3		
	3		
AVRO			
ANSON/AVRO XIX: No. built 11,020, in airline service 33.			
Austin 3 Leavens 2 N. Wings 1 Quebecair 1 Trans-Air 3 AREA 5	Air Navigation and Trading* 1 BKS Air Survey 1 Derby 1		Adastra* 2 Carsair 3 Flinders Is. 3 Gillham MMA 2 Papuan 3 Woods 2
15	3		15
YORK: No. built 257, in airline service 27.			
Trans-Air 2	Dan-Air 4 Skyways 11	LIA 1 MEA 2 Persian Air 1 Trans-Med. 6	
2	15	10	
TUDOR: No. built 33, in airline service 2.			
	Air Charter 2		
	2		
BRISTOL			
BRISTOL 170: No. built 214, in airline service 66.			
Wardair 1	Aviaco 3 Air Transport 1 Iberia 4 LTU 1 SCAL* 1 Air Charter 9 BOAC 1 Channel 2 Dan-Air 2 Eagle 1 Jersey 1 Shortcut 1 Silver City 21	Saudi Arab. 4 SNATA (Algeria) 2	Aigle Azur 1 Air Laos 4 Ansett-ANA 3 SAFE 3
1	48	6	11
BRITANNIA 100: No. built 15, in airline service 15.			
BRITANNIA 300, 310: No. built 42 (exc. 23 milit.), in airline service 39 (2).			
CPAL (310) 6 (2) A'naves de Mexico (300) 2 Cubana (310) 4 Transcontinental S.A. (300) 2	BOAC (100) 15 BOAC (310) 17 Air Charter (300) 2 Hunting-Clan (310) 2	El Al (310) 4	
14 (2)	36	4	
DE HAVILLAND			
LAPIDE: No. built 697, in airline service 102.			
SATGA 3 TAM (Peru) 6 Texader 4	Air Ouest 3 Falcks 1 Flugfelag 1 Iberia 1 Air Couriers 3 Air Navigation and Trading* 3 Airwork 2 BEA 2 Cambrian 1 Channel 2 Don Everall 2 Jersey 1 Luton 2 Morton 2 Skyways 1	Air Jordan 1 Iranair 3 Aerotechnique 1 Africair 2 Air Algerie 3 Air Brousse 4 Air Ivoire 2 Air Madagascar 6 Caspair 3 DETA 4 DTA 3 EAAC 4 Sierra Leone 3 STA (Angola) 3 TAGP 2 TAG (Gabon) 2 Zambezi 3	Borneo 3 Connellan 1 Fiji 1 N.Z. National 2 Transpac 3 Trans-Island 1 West Coast 2
13	27	49	13
DOVE: No. built 514, in airline service 55.			
Catalina* 1 Desert* 1 Gulf Coast 1 Sarnia Southeastern 1 TAG (Illini) 2 Tampico 1 Timmins 1	Falcks 2 Martins 1 SATA (Azores) 2 BOAC 2 Channel 4 Morton 5 Silver City 1	Gulf 4 Iranair 1 Iraqi 1 DETA 4 Sudan 4 WAAC 1	All Nippon 4 Japan A.S. 2 TAT 2 UBA 3 MMA 2 Southern 2 (FS)
8	17	15	15
HERON: No. built 136, in airline service 88.			
Catalina* 1 TAG (Illini) 1 Tri-County	Aviaco 5 Braathens 2 Falcks 1 UAT 7 BEA 2 Cambrian 1 (FS) Eagle 3 Jersey 6 Morton 2 North-South 1 Silver City 2	Gulf 3 THY 7 (FS) DETA 2 Ghana 2 TAGP 1 WAAC 8	All Nippon 3 Garuda 13 (FS) IAC 7 TAIP (Goa) 1 Transpac 1 Associated 1 Fiji 2 N.Z. National 1 (FS) Southern 2 (FS)
2	32	23	31

N. and S. America	Europe	Mid-East and Africa	Asia and Australasia
COMET 4 & 4B: No. built 20, in airline service 18 (16).			
A. Argentinas 2 (3)	BEA (6) BOAC 16 (3) Olympic (2)	EAAC (2)	
2 (3)	16 (11)	(2)	
HANDLEY PAGE			
MARATHON: No. built 11 (exc. 29 milit.), in airline service 7.			
	Air Navigation and Trading* 2 Derby 3		All Nippon 2
	5		2
HERMES: No. built 25, in airline service 15.			
	Airwork 2 (FS) Britavia 4 Falcon 1 Skyways 8		
	15		
SCOTTISH AVIATION			
TWIN PIONEER: No. built over 30 (exc. 36 milit.), in airline service 9 (5).			
	Scottish 1 Fison-Airwork 2	Brit. Internat. 2	Borneo 2 de Kroonduif 2 PAL (5)
	3	2	4 (5)
SHORTS			
SANDRINGHAM: No. built 33, in airline service 12.			
SOLENT: No. built 23, in airline service 4.			
Mantz (Sol.) 3 A. Argentinas (Sand.) 6 CAUSA (Sand.) 3			Ansett (Sand.) 2 TAI (Sand.) 1 TEAL (Sol.) 1
12			4
VICKERS			
VIKING: No. built 166, in airline service 102.			
LADE 15	Aero Transport 1 Aviameer 1 Balair 2 D. Flugdienst 2 Martins 1	Brit. Internat. 2 Iraqi 3 Misrair 6	IAC 12 TAIP (Goa) 2

(Continued on page 336)

N. and S. America	Europe	Mid-East and Africa	Asia and Australasia
VIKING (Contd.)	Air Safaris 2 Airwork 2 (FS) Channel 3 Continental 3 Eagle 12 Falcon 1 Hunting-Clan 7 Independent 5 Int. Charter 3 LTU 1 Orion 3 Overseas 2 Pegasus 3 Tradair 7	Trek 1	
15	61	12	14

VISCOUNT 700 series: No. built 281, in airline service 251 (1).

Capital	59	Aer Lingus 4 (FS)	1	Iraqi	4	Hong Kong	2
Northeast	10	Air France	11	Iranair	3	IAC	10
TCA	50	Alitalia	10	Kuwait	2	PAL	2
	—	Austrian	4	MEA	7	UBA	3
BWIA	5	Flugfelag	2	THY	4		—
Cubana	2	Airwork 2 (FS)			—	TAA	13
LANICA	1	BEA	24	CAAC	4		
LAV	3	Hunting-Clan	2	Misrair	4 (1)		
PLUNA	3						
TACA Internat.	1						
	134		59		28 (1)		30

VISCOUNT 800/810 series: No. built over 120, in airline service 118 (1).

Continental	15	Aer Lingus	6	Sudan	(1)	PIA	5
Eagle		KLM	9	SAA	7		—
(Bermuda)	1	Lufthansa	9			Ansett-ANA	4
	—		—			TAA	2
Cubana	4	Airwork	2			N.Z. National	3
Maritime		BEA	39				
Central	1	Hunting-Clan	3				
VASP	5	Transair	3				
	26		71		7 (1)		14

COMMONWEALTH

North America	Latin America	Europe	Elsewhere

DE HAVILLAND (AUSTRALIA)

DROVER: No. built 20, in airline service 9.

		Air Navigation & Trading* 1	Fiji 3 Qantas 1 TAA 4
		1	8

DE HAVILLAND (CANADA)

DHC-2 BEAVER: No. built nearly 1,300, in airline service 115.

TAG (Illini)	2	Avianca	11			CAAC	4
	—	CDA	1			World Wide	
Austin	5	TAM (Peru)	4			Helicopters	4
B.C. Air Lines	10	Taxader	2				—
Eastern						Aigle Azur	1
Provincial	9					Air Laos	1
Gagnon	1					de Kroonduif	3
Laurentian	6					Malayan	3
Mar. Central	3					Pioneer	1
McMurray	1						—
Nordair	3					Qantas	1
N. Wings	5						
Pac. Western	23						
Sask. Govt.	5						
Trans-Air	3						
Wheeler	3						
	79		18				18

NOORDUYN

NORSEMAN: No. in airline service 104.

Aleska	6	T.A. Orientales	1	Flugfelag	1	PAL	4
Interior*	3			Wideroes	6	Thai	3
Wien Alaska	5						—
	—					Carsair	1
Austin	8					Gibbes Sepik	5
Bradley	6						
Gagnon	3						
Georgian Bay	3						
Leavens	1						
McMurray	2						
Nordair	3						
N. Wings	3						
Ontario Central	8						
Pac. Western	12						
Parsons	2						
Sask. Govt.	4						
Trans-Air	10						
Trans-Labrador	1						
Wheeler	3						
	83		1		7		13

CANADAIR

DC-4M: No. built 46 (exc. 25 milit.), in airline service 31.

TCA	21		BOAC 3 Overseas 4	EAAC	3
	21		7		3

FLIGHT Airliner Census . . .

North America	Latin Americ	Europe	Elsewhere

U.S.A.

BEECHCRAFT

MODEL 18: No. in airline service 30.

Naples		Cruzeiro	4			Arkia	2
Wien Alaska	2	LANICA	1				—
	—	T.A. Buenos				Africair	1
B.C. Air Lines	1	Aires				DTA	5
Mar. Central	3					Misrair	1
Pac. Western	1						—
Quebecair	2					JAL	1
Timmins	1						—
Wheeler	1					Connellan	2
						Trans-Island	2
	11		5				14

BOEING

B.307 STRATOLINER: No. built 10, in airline service 8.

	COHATA 1			Air Laos	1
				Aigle Azur	5
				Air Vietnam	1
	1				7

B.377 STRATOCRUISER: No. built 56 (exc. 888 C-97/KC-97), in airline service 48.

Northwest	9		BOAC 1		
PanAm	24				
Transocean	14				
	47		1		

707-120: No. on order 59 (exc. about 300 KC-135 & VC-137 so far built), deliveries in progress.

American	24	Cubana	(2)			Qantas	7
Continental	4						
PanAm	6						
TWA	15						
	49		(2)				7

CONVAIR

CV-240: No. built 176 (exc. 395 milit.), in airline service 132.

American	49	A. Argentinas	4	D. Flugdienst	5	Air Jordan	2
Mohawk	11	Cruzeiro	10	KLM	2		—
Southeast	2	UMCA	2	LOT	4	Ethiopian	3
Western	6	Varig	10	Norronafly*	1		—
	—					Garuda	8
CPAL	5					Pakistan	3
Continental	3						—
						TAA	2
	76		26		12		18

CV-340: No. built 209 (exc. 108 milit.), in airline service 190.

Braniff	25	A'naves de		Alitalia	4	Saudi Arab.	10
Continental	1	Mexico	4	Finnair	3		—
Delta	20	Avensa	5	JAT	1	Garuda	8
Hawaiian	4	Cruzeiro	4	KLM	14	PAL	1
National	12	LACSA	2	Lufthansa	4		—
North Central	5	Real	6				
United	52						
Frontier	5						
	124		21		26		19

CV-440: No. built 153 (exc. 26 milit.), in airline service 139.

Braniff	5	Avensa	2	Alitalia	2	Garuda	3
Continental	3	Cruzeiro	4	Condor*	2		—
Delta	8	Real	15	Finnair	3	Ansett-ANA	6
Eastern	20			Iberia	5		
Fairways*	1			JAT	2		
National	6			Kar-Air	2		
Hawaiian	2			Lufthansa	5		
				Sabena	12		
				SAS	20		
				Swissair	11		
	45		21		64		9

CATALINA/CANSO: No. built 2,140, in airline service 56.

Alaska Coastal	1	AIDA	1	Flugfelag	2	Airways (India)	1
Arctic-Pacific*	1	PAB	5			CAT	2
	—	Transa Chile	2			Foshing	1
Austin	1	TAM (Peru)	4			Macao	1
CPAL	1	TAP (Brazil)	2			RAI	1
Eastern						UBA	1
Provincial	1						—
N. Wings	2					World Wide	
Nordair	3					Helicopters	3
Ontario							
Central	1						
Pac. Western	5						
Quebecair	2						
Timmins	2						
Trans-Air	4						
Trans-Labrador	1						
Wheeler	2						
World Wide Airways	3						
	30		14		2		10

North America	Latin America	Europe	Elsewhere

CURTISS

C-46: No. built 3,181, in airline service 388.

North America		Latin America		Europe		Elsewhere	
Aaxico	22	Aerunion	2	Aeropa	2	Air Jordan	1
Aero Enterprise*	3	Aerovias Q	4	Olsen	3	LIA	1 (FS)
Air Cargo Exp.*	2	ANSA (Costa Rica)	1	Transair (Sweden)	5	Air Cameroun	2
Alaska	3	APA	2				
All American*	3	APSA (Peru)	1			Aigle Azur	1
Arctic-Pacific*	2	Austral	2			Air Vietnam	1
Argonaut*	3	Avensa	3			CAT	18
ASA	4	Aviateca	2			Foshing	1
Associated*	4	California	2				
Braniff	2	CBF	3				
Cal. Air Freight*	1	CDA	4				
Cal. Central*	2	CEA	2				
Cal. Hawaiian*	2	COPA	2				
Capitol*	22	Cuba Aeropostal	3				
Connor*	3	Expreso Aereo Interamericano	3				
Cont. Charter*	3	LAC	3				
Cordova	1	LACSA	4				
Currey*	2	LANICA	2				
Delta	5	LAV	4				
Federated*	2	LEBCA	3				
Flying Tiger	2	Lineas Interamericanas	3				
Golden State*	1	Loide	23				
Great Lakes*	1	NAB	2				
Interior*	3	RANSA	19				
Los Angeles*	1	Real	12				
Meteor*	6	SAHSA	1				
Miami*		TACA Internat.	1				
Mercury*	1	TAN	3				
Modern A.T.*	3	TAP (Brazil)	6				
Quaker City*		TAPSA (Peru)					
Regina*	2	Tigres Voladores					
Resort*	5	Transamerica	2				
Reeve	1	Transcontinental	5				
Riddle	31	Transa Chile	3				
Seaboard	1	Varig	14				
Skyways*	2						
Slick	3						
Southern A.T.*	4						
Southern Cross*							
Trans-Carib.*	1						
Trans-Global*							
Universal*	2						
Westair*	7						
Whesport Air Cargo*	2						
Wien Alaska	3						
World Wide*	3						
Zantop*	8						
CPAL	6						
Mar. Central	5						
N. Wings	1						
Nordair	1						
Pac. Western	2						
Quebecair	1						
Wheeler	2						
World Wide Airways	5						
	207		146		10		25

DHC-3 OTTER: No. built about 300, in airline service 29.

TAG (Illini)	2		Wideroes	4	Aigle Azur	3
CPAL	1				Air Laos	2
McMurray	1				All Nippon	1
Pac. Western	1				PAL	6
Sask. Govt.	1					
Trans-Labrador	1				Qantas	4
Wheeler	2					
	9			4		16

DOUGLAS

DC-3, C-47: No. built 10,928, in airline service 1,672.

North America		Latin America		Europe		Elsewhere	
Alaska	1	ALA (Argentine)	4	Aer Lingus	9 (FS)	Aden	5
Allegheny	15	A. Argentinas	15	Air France	35	Air Jordan	1
Aloha	7	A'naves de Mexico	26	Airnautic	1	Air Liban	4
Amer. Flyers*	4	Aeronorte	4	Alitalia	8	Arkia	4
Arctic-Pacific*	2	AMSA (Mexico)	5	Austria Flugdienst		Iranair	16
Avalon	1	APSA (Peru)	2	Braathens	2	Kuwait	2
Blatz*	2	AREA	2	CSA	20	MEA	4
Bonanza	10	Avensa	15	Finnair	10	Saudi Arab.	10
Braniff	22	Avianca	31	Flugfelag	3	Syrian	3
Cal. Air Charter*	1	Aviateca	5	Iberia	15	THY	21
Cal. Central*	2	Bahamas	2	JAT	13	Yemen	2
Cal. Hawaiian*	2	BWIA	5	Kar-Air	3	Aerotechnique	6
Capital	20	British Guiana	4	KLM	10	Africair	12
Cal. Pacific*	1	CDA	2	Linjeflyg	8	Air Algerie	3
Caribair	4	COPA	2	Lufthansa	3	Air Madagascar	3
Catalina*	1	Cruzeiro	34	Olsen	1	Aircraft Operating Co.	1
Central	13	Cubana	6	Olympic	14	CAAC	5
Connor*	1	Faucett	8	Sabena	28	DETA	5
Cont. Charters*	1	LAB	7	Swissair	8		
Continental	10	LAC	1	TAI	4	DTA	6
Cordova	2	LACSA	4	TAP	4	EAAC	9
Delta	12	LADE	3	Transair (Sweden)	2	Ethiopian	8
East-West Air*	1	LADECO				Ghana	2
Executive Business Transport*	2	LAN (Chile)	17	Airwork	2 (FS)	Hunting-Clan African	2
Fairways*	2	LANICA	7	BEA	37	Liberian	2
Frontier	25	LAUSA	3	BKS	2	Misrair	3
General*	2	LAV	16	Cambrian	3		
Great Lakes*	1	Mexicana	19	Dan-Air	2		
		NAB	15				

North America		Latin America		Europe		Elsewhere	
Hawaiian	8	PAB	10	Derby	5	R. Air Maroc	3
Interior*	2	PLUNA	6	Don Everall	2	SAA	6
Johnson*	2	RANSA	2	Hunting-Clan	5	Sudan	7
Las Vegas Hacienda*	2	RAS	3	Jersey	2	Tunis Air	3
Lake Central	10	Real	84	Scottish	1	WAAC	8
Mackey	2	Sadia	2	Silver City	10		
Mantz*	1	SAHSA	7	Skyways	6	Air Ceylon	2
Meteor*		Santafesinas	1	Starways	3	Air India	1
Mercer*	1	SAVAG	6	Transair	6	Air Laos	9
Miami*	2	TAC (Brazil)	1			Air Vietnam	7
Mohawk	8	TACA de Hon.	10			Aigle Azur	6
North Central	32	TAJ (Mexico)	2			Airways (India)	3
North. Consol.	4	TAM (Peru)	8			All Nippon	9
Northeast	11	TAMSA	2			Ariana	4
Northwest	4	Taxader	3			Cathay Pac.	1
Ozark	24	T.M. de Cortes	3			CAT	5
Pacific	11	Tolima	5			Cambodge	1
Pac. Northern	4	Varig	23			Cosara	4
Palm Springs*	1	VASP	15			de Kroonduif	3
Panagra	1					Foshing	2
PanAm	4					Garuda	20
Piedmont	21					IAC	59
Purdue*	2					Kalinga	8
Quaker City*						Korean Nat.	3
Reeve	3					Malayan	10
Regina*	1					North Japan	1
Samoan						PAL	23
Sourdough*	2					PIA	10
Southeast	5					Royal Nepal	3
Southern A.T.*	1					Thai	7
Southern	16					UBA	8
Standard*	2						
Stewart*	3					Adastra	1
Trans-Alaskan*	2					Ansett-ANA	14
Trans-Internat.*	6					Butler	5
Transocean	1					East-West	4
Trans-Texas	21					Guinea	5
TWA	5					MMA	6
20th Century*	1					Mandated	5
Viking*	2					N.Z. Nat.	25
West Coast	14					Qantas	8
Western	2					Queensland	3
Wien Alaska	1					TAA	17
Zantop*	2						
Austin	2						
CPAL	6						
Mar. Central	5						
N. Wings	2						
Nordair	3						
Pac. Western	5						
Quebecair	6						
Sask. Govt.	1						
Trans-Air	3						
TCA	9						
Trans-Labrador	2						
Wheeler	4						
World Wide	3						
	465		457		287		463

DC-4, C-54: No. built 1,163, in airline service 377.

North America		Latin America		Europe		Elsewhere	
Alaska	2	A. Argentinas	6	Air France	27	Air Jordan	1
American	2	A'naves de Mexico	3	Am. Internat.	4	Air Liban	1
ASA	1	Aerovias Q	1	Balair	2	Iranair	1
Cal. Eastern*	1	AMSA (Mexico)	2	Braathens	2	Jordan Internat.	1
Cal. Hawaiian*	3	APA	1	CDL	2	Kuwait	2
Capital	12	ATSA	1	Flugfelag	1	LIA	2
Civil Air Transport*	1	Avianca	10	Iberia	7	Trans-Arabia	1
Central*	2	Aviateca	2	Loftleidir	2	Trans-Med.	2
Currey*	1	CDA	2	LTU	2	Saudi Arab.	5
General*	1	Faucett	4	KLM	1	Syrian	3
Golden State*	1	Guest	1	Olympic	2		
Great Lakes*	4	LAB	2	Sabena	8	Africair	2
Las Vegas Hacienda*	1	LADE	1	Sobelair	1	Air Algerie	9
Los Angeles*	1	Loide	2	Sudflug	2	R. Air Maroc	4
Mackey	3	Mexicana	6	TAI	2	SAA	7
Meteor*	2	RAS	3	TAP	3	Trek	2
Miami*	1	Real	3	UAT	1	Tunis Air	2
Northwest	11	TACA Internat.	2				
Overseas Nat.*	2	TAP (Brazil)	2	Air Charter	3	Vacair	2
Pac. Northern	3	Transamerica	2	Independent	3	Ariana	2
Panagra	2			Starways	2	CAT	2
PanAm	22					Cathay Pac.	1
PSA	4					Cosara	4
Reeve	1					IAC	6
Regina*	1					JAL	9
Resort*	11					Korean Nat.	1
Riddle	4					Malayan	1
Seaboard	4					TAIP (Goa)	2
Seven Seas	2					Thai	3
Slick	1						
Trans-Alaskan*						Ansett-ANA	2
Trans-Carib.*	3					Qantas	4
Transocean	3					TAA	3
TWA	6						
20th Century*	6						
United	2						
Universal*	2						
U.S. Overseas*	10						
Westair*	2						
World*	2						
World Wide*	2						
Mar. Central	4						
Pac. Western	2						
Trans-Air	1						
Wheeler	3						
Zantop*	2						
	157		56		77		87

North America	Latin America	Europe	Elsewhere
DC-6: No. built 175, in airline service 160.			
American 50	A. Argentinas 5	Alitalia 3	Air Liban 1
Braniff 9	Guest 4	KLM 6	LIA 1
Connar* 1	Mexicana 4	Sabena 2	—
Continental 1	TAN 1	SAS 7	Cathay Pac. 1 (FS)
Delta 7		TAI 1	—
National 4			Ansett-ANA 2
PanAm 4			TEAL 3
Trans-Carib.* 1			
United 42			
119	14	19	8
DC-6A & DC-6C: No. built 75 (exc. 167 milit. DC-6A), in airline service 73.			
Alaska 3	Loide (C) 4	KLM 2	Air Liban (C) 2
American 8		Sabena (C) 1	—
Great Lakes* 2		Swissair 1	JAL 3
Hawaiian 1		UAT 3	
Northwest 5		—	
Overseas Nat.* 4		Eagle 3	
PanAm 5		Hunting-Clan 2	
Regina* 2			
Slick 3			
Trans-Carib.* 3			
United 7			
U.S. Overseas* 2			
—			
CPAL 6			
Mar. Central (C) 1			
52	4	12	5
DC-6B: No. built 287, in airline service 271.			
American 24	Avensa 3	Alitalia 8	Ethiopian 3
Braniff 1	LAN (Chile) 3	JAT 2	—
Continental 2		KLM 5	Cathay Pac. 1
Delta 4		Olympic 3	CAT 1
Eastern 9		Sabena 8	JAL 2
National 8		SAS 13	—
Northeast 10		Swissair 7	Ansett-ANA 4
Northwest 17		TAI 4	
Panagra 4		UAT 7	
PanAm 44			
United 41			
Western 27			
—			
CPAL 6			
197	6	57	11
DC-7: No. built 120, in airline service 118.			
American 48			
Delta 11			
National 4			
United 55			
118			
DC-7B: No. built 97, in airline service 95.			
American 10			SAA 4
Continental 5			
Delta 10			
Eastern 49			
National 4			
Panagra 6			
PanAm 7			
91			4
DC-7C: No. built 121, in airline service 117.			
Braniff 6	PAB 4	Alitalia 6	JAL 4
Northwest 17		KLM 15	
PanAm 25		Sabena 9	
		SAS 14	
		Swissair 5	
		TAI 2	
		—	
		BOAC 10	
48	4	61	4

FAIRCHILD

C-82A PACKET: No. built 224, in airline service 23.			
Trans-Internat.* 1	Aviateca 1	TWA 1	
	Cruzeiro 7		
	Guest 2		
	LACE 2		
	LEBCA 3		
	Mexicana 4		
	TAMSA 2		
1	21	1	

FOKKER/FAIRCHILD FRIENDSHIP

FOKKER F.27: No. on order 52, deliveries in progress.
FAIRCHILD F.27: No. on order 90, deliveries in progress.

Aloha 3	A. Argentinas (10)	Aer Lingus 7	PAL (2)
Bonanza 6	AREA (1)	Braathens 3	—
Mackey (2)	Avensa 5	Horten (1)	Ansett-ANA (6)
Northern Consol. 3	LAB (3)	KLM (2)	TAA 12
Ozark (3)	LAV (6)		
Pacific 4 (2)	T.M. de Cortes (1)		
Piedmont 8			
West Coast 6			
Wien Alaska (2)			
—			
Quebecair 2			
32 (9)	5 (21)	10 (3)	12 (8)

North America	Latin America	Europe	Elsewhere
GRUMMAN			
ALBATROSS: No. in airline service 3.			
GOOSE: No. built 345			
MALLARD: No. built 61 } No. in airline service 50.			
WIDGEON: No. built 286			
Alaska Coastal 9	Bahamas 5	Flugfelag 1	Tourist Air Travel
Avalon 7	British Guiana 2		Transocean 3
Cordova 2	St. Vincent 1		
Ellis 9			
Mackey 2			
Reeve 1			
—			
BNP* 3			
Laurentian 1			
Ontario Central 1			
Pac. Western 2			
Trans-Gaspesian 1			
38	8	1	3
LOCKHEED			
L.10: No. built 148, in airline service 20.			
Byerly* 1	LAN (Chile) 2		MMA 1
Prov.-Boston* 2	Santafesinas 3		South Coast 2
—	Skyways 1		Trans-Island 1
Eastern Prov. 2			
Matane 4			
Trans-Gaspesian 1			
10	6		4
L.12: No. built 114, in airline service 5.			
Trans-Air 1		Wideroes 2	Associated 1
			Carsair 1
1		2	2
L.14: No. in airline service 6.			
Pac. Northern 1			Adastra* 3
			East-West 2
1			5
LODESTAR: No. built 625, in airline service 18.			
National 4	LAV 1	Kar-Air 1	CAS (S. Africa) 3
—	Norsur 3	Linjeflyg 2	DETA 3
Timmins 1			
5	4	3	6
L.049, L.149 CONSTELLATION: No. built 88, in airline service 54.			
Braniff 2	Cubana 1		El Al 4
Capital 10			
Coastal Cargo 1			
Delta 4 (FS)			
TWA 32			
49	1		4
L.649, L.749, L.749A: No. built 133 (exc. 12 milit.), in airline service 127.			
Capitol* 4	A'naves de Mexico 2	Air France 15	Air Algeria 3
Eastern 18	Avianca 3	KLM 10	R. Air Maroc 1
Pac. Northern 5	Guest 2	—	SAA 4
Transocean 4 (FS)	LAV 1 (FS)	Skyways 4	
TWA 39	PAB 12		
70	20	29	8
L.1049A, 'C, 'D, 'E: No. built 102 (exc. about 320 milit.), in airline service 87.			
Eastern 28	Avianca 2	Air France 9	Air-India 5
Seaboard 3	LAV 1	Iberia 3	PIA 3
TWA 9		KLM 7	—
—			Qantas 10
TCA 7			
47	3	19	18
L.1049G: No. built 130, in airline service 101.			
Eastern 9	Avianca 2	Air France 13	Air Ceylon 1
TWA 28	Cubana 3	Iberia 2	Air India 4
—	LAV 4	Lufthansa 7	Thai 3 (FS)
TCA 4	Varig 5	KLM 9	—
		TAP 3	Qantas 4
41	14	34	12
L.1049H: No. built 54, in airline service 50.			
Capitol* 1	Real 4	Aerlinte 3	PIA 2
Flying Tiger 15	T'continental 3	KLM 2	—
National 4		Lufthansa 1	Qantas 2
Seaboard 3			
Transocean 1			
TWA 5			
U.S. Overseas* 2			
—			
TCA 2			
33	7	6	4
L.1649A STARLINER: No. built 43, in airline service 42.			
TWA 28		Air France 10	
		Lufthansa 4	
28		14	

(Concluded on page 339)

AIR COMMERCE

Differentials at Honolulu

ONE of the items on the agenda of the I.A.T.A. traffic conference at Honolulu was the future of the fare differential—or "jet surcharge" as it emerged from the last series of acrimonious I.A.T.A. conferences.

Briefly recapitulating, the compromise agreed last March was as follows: (1) A flat surcharge of $15 was imposed on one-way jet tickets (economy-class and tourist-class) on the North Atlantic. This was equivalent to a surcharge of 5.8 per cent on economy-class and 4.7 per cent on tourist-class. (2) A surcharge of $20 was imposed on all first-class and de luxe jet services on the North Atlantic. This was equivalent to 4.5 per cent on first-class tickets and 4 per cent on de luxe-class tickets. (3) Return jet surcharges were made double the above one-way charges. (4) A jet surcharge was imposed on routes between North and South America. On the New York - Buenos Aires sector this amounted to $20—equivalent to a surcharge of 2.6 to 4.3 per cent depending on the class of service.

So far as U.S. domestic jet services were concerned (being outside the jurisdiction of I.A.T.A.), the Civil Aeronautics Board approved the principle of jet surcharges. This was surprising because it conflicted with the C.A.B.'s previously declared policy that "fare differentials for particular aircraft types are inconsistent with sound rate-making principles . . . it is essential that jet services be integrated into the fare structure in such a manner as will permit their operation in any class of service . . ." In general, U.S. domestic jet surcharges today average about 6 per cent.

The jet differential was introduced by I.A.T.A. "as a temporary measure." It will be recalled that the surcharge was a compromise between the "sour grapes" group of airlines who would not have jets in service in 1959-60 (and who feared that unless a big jet surcharge were imposed on the jets they would lose traffic) and those who, having jets available for 1959-60, considered the idea of a surcharge an unfair penalty on their new jets.

It is important to record that no airline ever seriously suggested that the jet surcharge should take the form of a propeller "subcharge." Nor was it ever seriously considered by I.A.T.A. members (with the possible exception of B.E.A.) that a jet differential was desirable as a means of putting a brake on costly speed competition.

So where does the jet surcharge—or jet differential as it ought to be termed—go from here? It is apparent that jet surcharges have not penalized the jets, which on the North Atlantic, in America, and between North and South America have been as full as booking and reservation systems could make them. And because jets will still be in their honeymoon phase during 1960-61, and because the surcharge will continue to be a bounty rather than a penalty, it seems likely that it will stick, as a small surcharge, for at least another year.

Will it stick indefinitely? When jets are no longer a novelty, and when propeller airliners have been flown off the trunk-routes because a small differential is insufficient to attract the public to them, the jet surcharge will be nothing more than an increase in standard fares. The whole of the international air fare structure will then be determined by the operating cost of the jets, a quantity which by the end of next year should be thoroughly known. Whether jet operating costs prove to be higher or lower than existing propeller airliners remains to be seen. In the meantime the conference at Honolulu will have been wise to consider the fare differential as a device for the long-term economic benefit of the air transport industry, rather than as the short-term expedient that it is at the moment.

It is suggested that I.A.T.A. must allow propeller airliners to try their luck at fare levels substantially (say 15-20 per cent) below jet levels. They may or may not make money; but—and this is the crucial point—a differential of this order would encourage technology to produce propeller airliners whose design for low cost is uncompromised by the need to make them go as fast as possible. The international fare structure should not be determined by the operating cost of jets only.

If I.A.T.A. do not face up to this at Honolulu, they may find that the inevitable forces of economics will tempt airlines—including I.A.T.A. airlines—to find ways and means of using surplus propeller fleets at low fares outside I.A.T.A. control, either by the formation of separate companies or by association with independents.

There are already signs of this happening, as observers of the relations between Swissair and Balair and between Lufthansa and Flugdienst may have noticed. If I.A.T.A. ignores this trend at Honolulu it may find it developing into a defiant breakaway movement. It is essential for the future rule of law and order in air transport that the "great divide" (as it has been called) between high and low speed should be kept within the compass of I.A.T.A., otherwise that body will lose control of the very low fares on which the future prosperity of its members largely depends.

It is suggested that acceptance of the principle of a substantial fare differential between jets and propellers is one means by which I.A.T.A. can avoid the defiant breakaways that a "blanket fare" policy would invite.

AIRLINER CENSUS (concluded)

North America	Latin America	Europe	Elsewhere
L.188 ELECTRA: No. on order 161, deliveries in progress.			
American 35 Braniff 9 Eastern 40 National 23 Northwest (10) PSA (3) Western 9	A'naves de Mexico (3)	KLM 1 (11)	Cathay Pac. 2 Garuda (3) Ansett-ANA 2 Qantas (4) TAA 2 TEAL (3)
116 (13)	(3)	1 (11)	6 (10)
MARTIN			
2-0-2, 2-0-2A: No. built 43, in airline service 19. **4-0-4:** No. built 101 (exc. 2 milit.), in airline service 94.			
Allegheny (202) 5 Eastern (404) 57 Pacific (202) 8 TWA (404) 37	LAN (202) 4 LAV (202) 2		
107	6		
SOUTH AMERICA			
FAUCETT			
FAUCETT F.19: No. built about 30, in airline service 4.			
	Faucett 4		
4			
EUROPE			
N. and S. America	**Europe**	**Mid-East and Africa**	**Asia and Australasia**
BREGUET			
DEUX PONTS: No. built 16, in airline service 12.			
	Air France 12		
12			

N. and S. America	Europe	Mid-East and Africa	Asia and Australasia
NORD-AVIATION			
NORATLAS: No. built and on order 353, in airline service 12.			
	UAT 6	Arkia 3 Air Algerie 3	
	6	6	
SUD-AVIATION			
LANGUEDOC: No. built 100, in airline service 5.			
	Aviaco 5		
	5		
S.O.30P BRETAGNE: No. built over 50, in airline service 4.			
			Cosara 4
			4
CARAVELLE: No. built 10, in airline service 10 (40)			
Varig 1 (1)	Air France 5 (19) Finnair (3) SAS 4 (12)	Air Algerie (4) R. Air Maroc (1)	
1 (1)	9 (34)	(5)	
JUNKERS			
JU 52/3m: No. built 3,234, in airline service 8.			
T.A. Orientales 1	Iberia 2	DETA 2	Gibbes Sepik 3
1	2	2	3
SAAB			
SCANDIA: No. built 18, in airline service 15.			
VASP 15			
15			

AIR COMMERCE . . .

ARGOSIES AND HERALDS ON TOUR

OVERSEAS sales tours of the Argosy and the Dart Herald were in the news last week. Armstrong Whitworth announced that the fourth Argosy, G-APRN, is to start the first phase of an Argosy world tour on October 6. The itinerary will be as follows: Copenhagen, October 6; Stockholm, October 7-9; Oslo, October 9-17. The aircraft will then return to the U.K., resuming its tour as follows: Paris, October 14; Zurich, October 15; Rotterdam, October 16.

G-APRN will carry a representative "palletized" freight load including a spare Dart. Demonstrations of the sort seen at the Paris Show and at the S.B.A.C. Display (but using local trucks and drivers) will be given. Today, October 2, G-APRN was due to fly to the Isle of Man at the invitation of the Governor to demonstrate its potential for opening up the freight trade of the island.

Meanwhile, the Argosy test programme continues on schedule, with certification due in March. Argosy G-APRL, which left the U.K. on August 30 for its tropical trials in the Sudan, has been making good progress despite "the coldest and wettest summer for half a century." Inconstant temperature lapse rates have caused most of the difficulties, reports A.W.A.'s senior test pilot, Mr. William Else, who uses the word "magnificent" to describe the serviceability record. Meanwhile, the sixth Argosy flew on September 24, and total AW.650 flying hours as this page went to press were 539.

Handley Page report that Dart Heralds G-AODF (No. 2) and G-APWA (No. 3, first production aircraft) will shortly embark on a 60,000-mile tour of Australia and the Far East, led by G/C. A. F. Bandidt. Both aircraft will be present at the opening of Wellington Airport on October 24. Because G-APWA will be ready only just in time, G-AODF (veteran of 50,000-mile tours of Asia, the Middle East and South America) will fly out ahead in the hands of S/L. H. G. Hazelden, just in case of hold-ups to G-APWA. It will return to the U.K. after the Rongotai celebrations. The subsequent itinerary for G-APWA, which will be flown by "Hazel," will be as follows: Christchurch, Oct. 27-29; Nelson, Oct. 29-30; Sydney, Nov. 3-4; Canberra, Nov. 4-7; Melbourne, Nov. 7-12; Sydney, Nov. 12-16; Port Moresby, Nov. 17-20; Lae, Nov. 20-22; Jesselton, Nov. 23-25; Manila, Nov. 25-29; Singapore (and Kuala Lumpur), Nov. 29-Dec. 3; Djakarta, Dec. 3-5; Saigon, Dec. 6-9; Bangkok, Dec. 9-11; Rangoon, Dec. 11-15.

BLACK BOXES DISCUSSED

THE increasing maintenance requirements of electronic systems in air transport was the background to the first meeting, held in London on September 22 and 23, of the European Airlines Electronics Committee. It was attended by radio and electronics representatives of the following airlines: Air France, Alitalia, Lufthansa, Finnair, K.L.M., S.A.S., Sabena, Swissair, U.A.T., B.E.A., B.O.A.C.

The meeting was organized for the Committee by B.O.A.C., with the participation of B.E.A. Chairman was Mr. R. D. Jones of B.O.A.C. After the meeting, which was attended by manufacturers' representatives, Mr. Jones said that manufacturers had emphasized how valuable it would be if airlines could have a common policy on electronics maintenance practices.

FIRST AIR-CUSHION LINE?

THE first-ever commercial application of an air-cushion vehicle may be the operation by Southern Airways Inc., of Miami, of a cargo service to the Bahamas. According to a report in *Aviation Week*, if the performance of a 15,000 lb empty weight vehicle to be constructed by Spacetronics comes up to expectation, the airline will place an order for two at a cost of $60,000 each.

The vehicle, which measures 50ft by 32ft, should have a payload of 40,000 lb (a hull loading of 25 lb/sq ft) and a cruising speed —powered by five 270 h.p. industrial engines—of more than 50 m.p.h. over smooth water and a maximum speed of nearly 100 m.p.h. Construction is to begin this month to detail designs prepared by the Aluminium Corporation of America, who are giving their engineering assistance free. Like the Curtiss-Wright Air-Car, the Spacetronics air-cushion vehicle operates on the plenum chamber principle and it is hoped to achieve a hover height of two to three feet with an internal pressure of about 18 lb/sq ft.

Two smaller vehicles are also to be constructed; a sales demonstrator which should be airborne within the next two months and another, which is to be built under contract to the U.S. Marine Corps, should be delivered before January 11.

M.E.A. DIGS IN ITS HEELS

THE continued association of B.O.A.C. and Middle East Airlines was last week in jeopardy—and nearer to severance than at any time since B.O.A.C. acquired 49 per cent of the airline's shares in 1955. The cause of the trouble is M.E.A.'s sensitivity to the widely reported remarks of the Minister of Transport and Civil Aviation about "drastic losses in this company" and by Labour M.P. Mr. Frank Beswick's reference to M.E.A. as "one big sieve through which public money has been poured."

In fact, says the airline, although a great deal of money was lost last year during the Lebanese revolution—more than the published amount of £800,000, and at one stage over £100,000 a month—this was due to political causes, and this year the airline should make a profit of about £120,000. B.O.A.C.'s £3m equipment loan and £2m funding loan to M.E.A. is not a bad debt although there is no fixed maturity date. Interest on it is being paid at the rate of 6 per cent, right on time, through the I.A.T.A. clearing house.

The airline is particularly piqued that B.O.A.C. should have "appeared unwilling" to defend its associate's reputation in Great Britain and claim that their prestige has thereby suffered considerably. After nearly four weeks of discussions with B.O.A.C. in London, Sheik Najib Alamuddin, chairman of M.E.A., last week offered to repay the B.O.A.C. funding loans within three years (by raising capital in the Lebanon), to repay the equipment loans within eight years from 1960, and to buy out—at the book value on December 31, 1958—the Corporation's 49 per cent shareholding of M.E.A.'s £6.5m (Lebanese) capital. This offer has been rejected by B.O.A.C. and an alternative proposal made by the Corporation to M.E.A. was turned down by the Sheikh. A B.O.A.C. proposal made earlier this year to convert their £5m loan to equity capital was refused on the grounds that this would virtually give B.O.A.C. complete control of the airline, which would jeopardize M.E.A.'s traffic rights and be politically impossible in the Lebanon. Further discussions have been held during the past week about "mutual respect of interests and fair trading."

Neither airline, it is clear, has any real wish to sever its connection with the other; to B.O.A.C.'s advantage is feeder and inter-line traffic (said to be estimated by the Corporation at £300,000 a year) and the protection by M.E.A. of unlimited traffic rights in the Lebanon, the value of which has been estimated at £1½m a year. Direct payments to B.O.A.C. in commissions, handling and loan interest have amounted to £850,000 since 1956, and the airline has spent £5½m on goods and services in the U.K.

The greatest advantage of the association to M.E.A. lies in the prestige of being a "B.O.A.C. associate" and in the possibility of buying British equipment; Viscounts made possible M.E.A.'s expansion to full international status, and the airline now requires new aircraft with which it can operate competitive economy fares. Because many of its engineers in the Middle East Aircraft Service Company (MASCO) and all its pilots are British, its preference is for British aircraft. But if sufficient local capital should be raised to buy out B.O.A.C., there would be no hope of raising more for financing new equipment, and a new partnership would become essential as soon as the effect of low fares became felt in the Middle East. This is in spite of offers from Lockheed by which the airline could purchase Electras out of revenue without a deposit and with its Viscounts taken in part exchange.

What of Air Arab, the proposed union of Lebanese, Iraqi, United Arab Republic and Saudi Arabian airlines, about which a meeting is being held in Beirut tomorrow and of which Sheikh Alamuddin is chairman? "It is bound to come," the Sheikh said last week, "and we shall be included."

In the cockpit of the Avro 748 mock-up sits Mr. C. J. Stevens, managing director of B.K.S. Air Transport, the independent which has placed a provisional order for two with an option on three for delivery early in 1961

Flying the Vanguard

By G. R. BRYCE*

TO date the company's test pilots have flown approximately 400 hours on Vanguards towards the completion of the Certificate of Airworthiness programme agreed with the Air Registration Board. Herewith a few lines on some of the characteristics which my airline colleagues may enjoy, or otherwise, next year when they find themselves operating the Vanguard in service.

Starting and the associated checks are no different from those on other simple propeller-turbine aircraft; the systems are relatively straightforward—a lot of them being reminiscent of the Viscount's better systems. Taxying is a straightforward enough task, though one must get used to the Beta control incorporated in the four D.H. propellers. Briefly, this Beta control functions only whilst you are on the ground; if the throttles are moved in the ground regime you no longer demand r.p.m., you manually schedule propeller pitch. This gives you *immediate* thrust control at all times on the ground and it could be compared to driving a car in first, or maybe second gear. There is immediate reaction to the throttle and immediate retardation on taking the throttle off. Fitted on four engines, Beta gives the ability to taxi accurately backwards, forwards and tightly around the corner, and I think if you tried hard enough you might even get it to go sideways, although possibly Mr. Dunlop would not approve. All controlled manually through push-pull rods—no electrics.

The take-off is straightforward enough, the controls becoming pretty effective around 70 or 80 kt. The minimum control speed (no nosewheel steering permitted) on the ground with the critical engine cut has been established only recently at Bedford as being 95 kt indicated. In free air the minimum control speed is 103 kt indicated. The minimum control speed on the ground of 95 kt is using aerodynamic controls only, the B.C.A.R. 1959 requirements prohibiting the use of the nosewheel steering for certification purposes. V_2s vary between 115 kt and 128 kt; the ground acceleration is good as one would expect with this particular configuration. Using nosewheel steering V_{mcg} is zero.

The best climbing speed is 180 kt indicated but bearing in mind floor angles, passenger comfort, air traffic and the like, I should imagine there is every likelihood that on the line the climbing speeds might possibly be higher. Vision from the Vanguard's cockpit is better than any civil aircraft I have been through—a total of 36 sq ft of transparency.

The stability throughout the c. of g. travel is positive, particularly laterally, the dihedral on the main planes having been increased by 3 deg on this aircraft compared with the Viscount. The climb performance at mean weights works out at a touch over 1,000ft/min, averaged to 25,000ft. During the recent warm summer, at the maximum weight we have climbed to 28,000ft for test purposes, with a certain amount of gay abandon to 20,000ft and a little bit tired between 20 and 28,000. On the climb you will find the ailerons at 200 kt I.A.S. produce a fairly large and acceptable rate of roll if required. I would say the ailerons will be enjoyed by the majority of airline pilots, although as test pilots we find them just a touch on the heavyish side. The elevator is good on the aircraft (we had little or no trouble with it); the rudder as it stands right now leaves a little to be desired—but need I say the appropriate modifications are being incorporated into our flight test programme?

On reaching your cruising altitude, the aircraft takes a minute or three to accelerate up to its correct indicated cruising speed of around 250 kt plus at 20,000ft plus. On the cruise the controls are well harmonized and pleasant to operate, as indeed are the trimmers. The 36 sq ft of transparency are electrically heated and it does rather help to be able to see out of the windows for a change instead of using matchboxes to you-know-what [to clear the ice].

The dives to the design diving speed have been started from around 26,000ft and a fairly enthusiastic angle had to be achieved to enable us to get on to the M=0.74 line in the early 20,000ft. Incidentally, Mike Lithgow finished the V_{ne} handling recently power *off*. At V_d the Vanguard does not "tighten-up" as so many other aircraft do and is, surprisingly perhaps, a pleasant aeroplane to fly at these Mach numbers; one does confess that before reaching 400 kt indicated at sea level, both Trubshaw and myself were somewhat dubious about this aircraft. After all, the shape of it does not really look the aerodynamicist's dream aircraft for these fairly high indicated airspeeds; bear in mind the maximum permitted indicated speeds on some of our present day swept-wing jet civil aircraft. On reaching the 400 mark Trubshaw, who was flying the aeroplane, had the same thought as myself and the situation was near amusing when the old girl picked up her skirts and scratched along as happy as can be at this—let's face it—fairly high indicated airspeed for this type of aircraft.

At the other end of the speed range, the approach to the stall, power off and power on, is not dissimilar to a Viscount; however, the elevator stick forces are higher, there is more aerodynamic buffet and there is less need for use of lateral control to maintain wings level (dihedral ?). The Vanguard has been down to a minimum speed of 74 kt indicated in the power on, flaps 40 deg, stall (maximum landing weight), and I would venture the opinion that the British and American stalling requirements will be met with the greatest of ease. We are incorporating, in spite of the natural buffet, a stick shaker (some argument here as to the need and advisability of fitting it)—for my money it cannot do you any harm and I think it is not a bad 1959 gimmick to have on an aircraft.

Instrument flying is good on the aircraft. Rolls-Royce have done a good job on their torque indicators on the Tyne engines, and precise control over speed and flight path is readily available. Instrument approaches are pleasant; maybe it is to do with its size but it sits nicely where you put it. Landings have been done on three and two engines, likewise flapless landings, the maximum crosswind to date being 27 kt. No problem.

The threshold speed on the aircraft is 118 to 126 kt, fast enough I admit, but like all other manœuvres on this aircraft, and I think it might be something to do with the handsome vision: everything seems to happen pretty slowly. On landing you manually/mechanically select ground idle or any other propeller pitch angle in the ground regime you desire with this rather novel Beta feature.

By the way, all mod. cons. fitted on the flight deck—coffee cup holders, hat racks, coat hooks, ashtrays and suitable storages for brief cases and *Daily Telegraphs* for the crossword puzzle enthusiasts.

Well, there it is—a straightforward, pleasant enough aeroplane to fly, not as big and as heavy as some of these devices scratching around, but the aircraft does have manual controls and at either extreme end of the speed range one, understandably so, has got to pay attention to one's work. In the middle for line operation, I do not think the future captains are going to disagree too much about what I have said in this thumbnail sketch. Those of you who do not go on to the aircraft will never be any the wiser, and maybe the others I meet at Wisley might stick this in front of my nose if they have any objections when they come here to check out.

Quite a lot of pilots have flown the aircraft now, a fair cross-section of them on our recent tour to Canada. When the aeroplane was a lot greener than it is now it was flown on several occasions by my managing director [Sir George Edwards]—and I do not mean scratching around at 20,000ft, but gloves on, jacket and tie off, circuits and landings; likewise by the president of Trans-Canada Air Lines. Dare I say it, if they can cope it should not be too difficult for the rest of us?

John McDonald, one of the senior Capital Airlines Viscount pilots and their local A.L.P.A. representative, flew the Vanguard in Montreal and he summed it up by saying, "Say, this is nothing more than a king-size Viscount." Always agreeing with the customers, I agreed with him; but in actual fact this aircraft is not a king-size Viscount. The Vanguard is a better machine to fly than a Viscount, which I think is fair comment; indeed, it should be, bearing in mind that our design colleagues should know a lot about the Viscount's good qualities after two million hours' operation. I think that comes out very noticeably when you poke the Vanguard in and out of some of the tough corners in the flight envelope—it is obviously an aircraft designed on experience and a lot of background. Next time you see A. S. Johnson, Mike Mitchell, George Lothian or Ron Baker, ask them what they think.

Jock Bryce is chief test pilot of Vickers-Armstrongs (Aircraft), and these notes are a slightly abridged version of a report circulated to the company's customers.

WHAT'S THE "AIRTIME"?

A NEW timetable, developed by the Air Research Bureau, will be available next month. Known as *Airtime*, it is intended to provide a quick reference to European air services. The first specimen copy was reviewed at the Air Research Bureau's 26th Assembly of Presidents which took place in Hamburg last month under the chairmanship of Mr. H. M. Bongers of Lufthansa.

Present membership of the Air Research Bureau, the common market research organization of the scheduled European airlines, is as follows: Aer Lingus, Air France, Alitalia, B.E.A., B.O.A.C., Lufthansa, Iberia, K.L.M., S.A.S., Sabena, Swissair. Associate members are Finnair and Icelandair. The next Assembly of Presidents will take place in Rome on March 4, 1960.

AIR COMMERCE . . .

HILDRED VERSUS I.A.T.A.

IT is unprecedented for the words of Sir William Hildred, director-general of I.A.T.A., to be qualified by his executive. Yet this happened last month as a result of a speech he made in York before the British Association for the Advancement of Science. In the course of it he referred to the need for low fares in the following terms: "We must get passenger fares and cargo rates down still further . . . it is the task of the conference to recognize these facts of the life about us and come up with fares and rates which governments can approve and which the public will find too attractive to ignore."

According to the American publication *Aviation Daily*, I.A.T.A. headquarters in Montreal said that Sir William was making remarks that were "purely of a personal nature and the I.A.T.A. staff will not be able to go to the traffic conference with a policy favouring lower fares. I.A.T.A. staff do not and cannot take any official position on policy matters before traffic conferences. While they may have personal opinions, and can on occasions voice them, their rôle in conferences is officially neutral and impartial."

Sir William's words were quite clearly of a general nature, because as spokesman for nearly 90 world airlines he has to choose his words warily. It seems that Sir William can talk about the need for low fares, but not on the eve of a fares conference, unless his views are "purely personal."

AND NOW THRIFTCOACH

A SIGNIFICANT development appears to be taking place in America. The Civil Aeronautics Board is being pressed by Delta to approve "thriftcoach" fares on piston equipment (DC-7s).

In C.A.B. hearings on the crucial Southern Transcontinental Service Case the airline proposes a DC-7 service between Atlanta and Los Angeles at $79—21 per cent below existing coach fares. Likewise, a Miami - Los Angeles service would be priced at $95, also 21 per cent below existing coach fares.

The much debated question of how to use surplus piston equipment may well be answered more and more in this way; and it is significant that Aircraft Exchange has announced it is making an economic survey of the potential low-fare market for used airliners.

Meanwhile, Pan American have decided to convert ten of their DC-7Cs to all-cargo work. This will be done by Lockheed Aircraft Service (work began last month) at a cost of about £1 million. Pan American are thus following the lead of American and United, both of whom—as discussed in *Flight*'s recent survey of the future of the air cargo market—have already placed orders with Douglas for the conversion of DC-7Bs and DC-7s to all-freighting. Air-India, too, are having three L.1049Gs converted by Lockheed Aircraft Service for all-cargo work.

VOICE OF THE FLIGHT ENGINEER

THE flight engineers, who have just as deep a vested interest as the pilots in the third crew-member controversy, are not nearly as vociferous. Thus the following rare statement of policy, issued by the International Transport Workers' Federation (president: Frank Cousins) is worth putting on record:—

"Representatives of the International Transport Workers' Federation (ITF) and of the International Technical Institute for Flight Engineers (ITI), meeting together as an *ad hoc* committee in London, have reviewed the flight deck layout of jet aircraft. Taking into full consideration the operational jet experience of the United Kingdom and France coupled with authoritative statements based on considerable experience by the pilots in the United States and United Kingdom and supported by responsible opinion in B.O.A.C. and Air France, the meeting concludes that the flight deck layout on American jet civil airliners does not measure up to the requirements of jet experience now available.

"The *ad hoc* meeting commends the modifications to the Boeing 707 required by B.O.A.C. since such modifications are designed to meet the demands of operational experience. The meeting is further satisfied that in large modern jet or turboprop equipment, the pilot should not be required to operate any routine items or be responsible for basic engineering duties except in cases of emergency. Whilst recognizing the overall responsibility of the pilot-in-charge, the meeting considers that the engineering controls and equipment should be the direct responsibility of the flight engineer and that this basic requirement, dictated by jet operational experience, is best effected by the provision of a flight engineer station equipped with the necessary seat and associated facilities which will enable him to discharge his functions on the aircraft in the interests of both efficiency and economical operation."

The first of Air France's 17 Boeing 707-320s, "Chateau de Versailles," flares out over Boeing Field at the end of its initial flight on September 18. It is due to be delivered early this month, and to inaugurate non-stop Paris - New York services this winter

707 RUNWAY LIMITATIONS

AT about the same time that Qantas announced their decision to charter Comet 4s from B.O.A.C., because of 707 runway limitations on the Kangaroo route (see last week's issue), Pan American encountered similar difficulties on two of their 707 routes.

The "transpolar" services inaugurated last month between London and California via Goose Bay in Labrador have been flying eastbound the normal North Atlantic route, refuelling at Boston. The reason for this is said to be that new F.A.A. jet take-off requirements as set out in SR-422B, which require substantial increases in rotation (V_R) and lift-off (V_2) speeds, have limited take-offs at Los Angeles and San Francisco by more than 10,000 lb. The runway at Los Angeles is 10,000ft and at San Francisco 8,870ft.

Similarly, the warm weather and the short runway at Tokyo (8,400ft) have forced Pan American to postpone non-stop 707 flights between Tokyo and Honolulu. Instead these services will refuel at Wake Island. The postponement is stated to be temporary pending the arrival of cooler temperatures and an extension of the Tokyo runway, due to be completed shortly, to 8,500ft.

BEST FOOT FORWARD

RESTORATION of some of Cambrian's services for the coming winter season follows encouraging results from 1959 operations. As from November 1, the Cardiff/Bristol - Manchester service will be resumed on a basis of three return flights per week, with supplementary ones over peak holiday periods. The airline admits that the schedule is not ideal as it does not cater for day-return business traffic, but "economic considerations involved in operating a form of schedule completely satisfactory to all were so onerous that we had no alternative." When this service was operated in 1956 Cambrian's experience was that less than 5 per cent of the total traffic was carried on a day-return basis. Four proposals were considered, three of which showed probable yearly losses of £19,000, £40,000 and £29,000; the service adopted shows at least a prospect of breaking even although nothing will be contributed to overheads. Subject to Government approval, a 14.5 per cent fare reduction is to be offered on this service during the winter months.

Cambrian's Cardiff/Bristol - Southampton service, on the other hand, is to be suspended for the winter season—an arrangement which has caused dissatisfaction to Bristol's airport committee, who are concerned at the decreasing use of Lulsgate Bottom. Last week W/C. L. B. Elwin, Cambrian's managing director, was invited to attend a formal meeting of the committee. Discussing afterwards the operation of more services from the airport, he said, "For us it is a simple question of economics—are such services going to pay?"

ACCIDENT INVESTIGATIONS INVESTIGATED

THE accident investigations committee set up by the Minister of Transport, with Sir David Scott Cairns, Q.C., as chairman, has wide terms of reference. These are, in brief, to inquire into the regulations concerning accident investigations and the conditions under which flight-crew or maintenance-crew licences may be cancelled, suspended or varied.

The connection between accident investigations and licences becomes apparent only when the present system is examined. The Civil Aviation Investigation and Accident Regulations 1951 require a court of inquiry to report to the Minister on what it considers to be the causes of an accident, and to make any observations and recommendations which it considers might prevent similar accidents in future. The court can recommend the cancellation, suspension or endorsement of any licence, certificate or other document. The 1951 Regulations provide for a rehearing by a public inquiry if new and important evidence is discovered or if, in the opinion of the Minister, there are grounds for suspecting a miscarriage of justice.

All this would appear to be a reasonable and just procedure and one which should satisfy most parties. However, there is a process which has to be gone through before a public inquiry can be held. The Minister has to decide, on the advice of his officers, whether or not to hold a public inquiry or to continue with the less complicated process of a routine M.T.C.A. inspector's investigation. The matter rests in the hands of the Minister. For those

involved in an accident, particularly the air crew, his answer can have far-reaching effects.

The decision of the Minister to set up a special Committee was prompted no doubt by questions in the House in connection with the accident to Elizabethan G-ALZU at Munich in February 1958 and the accident to Viscount G-AORC at Prestwick in April 1958.

The Elizabethan crash caused the Minister to set up a special body to examine the position of Captain J. Thain in relation to (1) the findings of a German Court of Inquiry, and (2) his responsibilities under the Air Navigation Order.

The Viscount crash resulted in an inspector's report which, it was alleged, censured Capt. W. H. Hankin without giving him rights to which he was entitled by the Accident Regulations to produce evidence and to examine witnesses upon whose evidence he might have been blamed. Captain Hankin had, in fact, requested a public inquiry, as he considered it in the interests of aviation in general that certain facts should be aired in public.

M.T.C.A. inspectors' investigations are always held in private. At one time they were public, but the results were stated to be unsatisfactory. Although a person found blameworthy by an inspector's report can make representations to the inspector before the report is published, this did not produce a very satisfactory situation; and following questions in the House in 1954, the Ministry gave an assurance that an individual involved in an accident would be given the right, if he felt that his future was likely to be prejudiced by the findings of an inspector's investigation, to request a public inquiry. Unfortunately, in practice, it is not always easy to determine the point at which a pilot can be told that he is likely to be blameworthy.

There was some misunderstanding over the letter sent by the Inspector of Accidents to Captain Hankin, and the Minister told the House that he intended to clarify the rights of persons under the present regulations and procedures. A number of changes have been made in the application of the 1951 regulations, possibly the most significant being that when the Minister decides there shall be no public inquiry, his precise reasons will be made public.

To avoid future misunderstandings, the Minister has introduced a standard letter giving a clear and detailed statement of how a possibly blameworthy person can exercise his rights. The letter even includes a standard form of reply.

Although the right to question an inspector's report is still provided for by the regulations, the right to hear or see all the relevant evidence is not provided for. This is a matter which may well exercise the Committee. Furthermore, the individual, or those who represent his interests, has no right to insist upon the calling of specific technical witnesses, or the pursuit of a particular line of inquiry.

The principal function of any form of investigation should be to provide data which will assist in preventing similar accidents in the future. Another important requirement is that an investigation should always distinguish between data which have arisen out of legal arguments (such as compliance with regulations, etc.) and data which will contribute to the prevention of other accidents. During many inquiries the thought has arisen that the well-meaning efforts of those concerned were doing little to contribute to the prevention of future accidents. Much of the procedure is concerned with legal niceties.

It may be that the new Committee will make some recommendation on the conduct of coroners' inquests. If an accident results in the death of a person the law requires an inquest as well as an inspector's investigation and/or a public inquiry. At present there are no official arrangements for the co-ordination of inquests and investigations, though in practice an informal system of co-operation exists between the various authorities. However, during the public inquiry into the Southall Viking accident there was criticism of the duplication of effort caused by an inquest where the coroner investigated the technical aspects of the accident at great length.

Another recommendation of the Committee might be that the Accidents Investigation Branch of the M.T.C.A. be administered by the Royal Aircraft Establishment, a proposal made at the time of the Comet public inquiry. There would then be no lack of expert advisers; the A.I.B. and the R.A.E. would together constitute the investigating machinery.

For the first time Kai Tak Airport, Hong Kong, is open at night. The first bars of the new approach lighting system, 3,510ft of which curve round to the west for the famous rate-one turning approach over Kowloon City, can be seen in this view of the new runway taken from the north. The complete installation, which is duplicated and angled so as always to present a complete pattern to pilots, together with the runway- and overwater approach-lighting, was the work of G.E.C.

BREVITIES

The inauguration of Qantas 707 services on the Kangaroo route, scheduled for October 15, has been postponed until October 27 due to delays in the crew training programme caused by bad weather.

The four Viscount 810s of VASP have been operating at load factors of between 68 and 99 per cent on the six routes on which they are operated.

B.E.A. say that while there is "no question of an order for the Argosy" at the moment, "later, perhaps, when the design has proved itself in service with other operators, we may be able to consider having a few 'off the peg' for our freight services."

A conference last month in Budapest of all eastern European governments discussed the acceptance of I.C.A.O. annexes. Annexes 1-5 had already been accepted without alteration, while others, in particular Annexe 10, still "need much discussion."

Douglas Aircraft announces the appointment of Mr. J. P. McGowen as director of commercial sales. He succeeds Mr. Nat Paschall, who has resigned "because of the pressure of personal business," though he continues as a consultant and board member. Mr. McGowen was DC-6 and DC-7 project engineer and has been with Douglas as an engineer for 20 years.

There were two serious take-off accidents last week, the first on September 23 involving Saab Scandia PP-SQV of VASP, which crashed shortly after take-off from São Paulo Airport for Rio de Janeiro; all 16 passengers and the four crew members on board lost their lives. The second occurred on September 24 to a DC-7C of T.A.I., which crashed soon after take-off from Bordeaux on a service from Paris to the Ivory Coast. Only 12 of the 65 people on board survived.

It is provisionally estimated from statistical returns received to date that U.K. airlines traffic on scheduled and inclusive tour services in July amounted to 45.7 million short ton miles. This represents an increase of 16 per cent compared with July last year. Capacity operated increased by 12 per cent to 70.2m capacity ton miles and the overall load factor rose from 63 per cent to 65 per cent. In the first seven months of 1959 traffic amounted to 218m short ton miles compared with 189m in 1958 and 179m in 1957.

A B.O.A.C. DC-7C flew non-stop to Aden on September 15, a distance of 4,100 miles, in 14 hr 47 min. The return flight was also made non-stop.

The Japanese Civil Aeronautics Bureau has grounded the two Marathons operated by All Nippon Airways due to metal fatigue. Each has recorded 4,500 flying hours.

In a Press statement on the eve of the I.A.T.A. fares conference at Honolulu, Pan American said that a reduction in trans-Pacific and round-the-world air fares would be urged, and that these would be accomplished by extending the North Atlantic economy fare.

In September 1959 Sabena's helicopters carried their 250,000th passenger. Sabena's helicopter operations began on August 21, 1950, with mail flights, the first passenger services being started on September 1, 1953.

The motion for a debate by the Luton branch of the Royal Aeronautical Society on October 27 will be "That this house considers that the craze for speed is technically unsound, economically undesirable, and has taken all of the romance and most of the interest out of air travel."

Check 4 lives of B.E.A.'s Viscounts are now up to 3,000 hr compared with 1,200 hr when the type entered service. Equivalent Check 4 lives for other aircraft are as follows (original lives in parentheses): DC-3 Pionair, 1,500 hr (400); Heron, 1,400 hr (800); Rapide, 800 hr (600).

Aloha Airlines have placed a repeat order with Fairchild for three F-27s at a cost reported as $2,161,500. Aloha have already taken delivery of a fleet of three. Delivery of the repeat order is stated to be due in February, March and May 1960. Fairchild recently increased by 10 per cent the price of the F-27.

It is reported that Alitalia have placed a firm order with Sud Aviation for four Caravelles, with an option on four more, and that Sabena also intend to acquire Caravelles (though it is not known whether by direct purchase or by leasing from their Air Union partners). Meanwhile Varig have taken delivery of the first of two Caravelles, and are reported to be making plans for the inauguration of jet services between Brazil and New York before the end of this year. The second Varig Caravelle is due to be delivered in December.

Correspondence

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. Names and addresses of writers, not for publication in detail, must in all cases accompany letters.

Memories of 1917

MENTION in the Press of the recent reconstruction of an S.E.5 stirred my memory, and I have found these photographs [two are reproduced.—Ed.] and also a personal letter from Major H. D. Harvey-Kelly, D.S.O., all of which date from early in 1917. [Harvey-Kelly was the pilot of the first British aircraft to land on the Continent after the outbreak of war.—Ed.] I cannot remember who took the photographs but I do not think they have seen the light of day since 1919! They were all taken at London Colney. Three show an "early delivery" with my friend Capt. Albert Ball—the famous—in the cockpit, and, very clearly, the position and mounting of the overhead Lewis gun. I first met Ball when we were learners together at No. 9 R.S. at Norwich in 1915. The others show, equally clearly, the canopy which was mounted as found necessary to enable one to put a new drum onto the gun in its lowered position. After all these years I cannot recall the name of the other officer—whose face, however, is very familiar to me.

Major Harvey-Kelly left us to take command of No. 19 Squadron, R.F.C., in France—equipped with Spads, also powered by the Hispano-Suiza 180 h.p. engine. Ours had Wolseley built-under-licence H-S. engines. Harvey-Kelly was killed not long after writing his letter in, I believe, a lone dog-fight against three enemy machines. I have the most charming memories of him and the finding of his letter again has been most moving and evocative. Whatever you may decide to do with the photographs please do not destroy the letter [It has been presented to the Imperial War Museum.—Ed.]. His mention of notes I took in Paris refers to a visit I made to the Hispano factory at Bois Colombes, in charge of some half-dozen fitters from No. 56, to do a course on the engine. I had the advantage of being able to speak fluent technical French. I made detailed copies of the notes for squadron use and they ultimately led to my being posted to the Department of Applied Design, Engines, at the Air Ministry. Alas, I was not found fit to accompany No. 56 overseas.

On the occasion of the visit to Paris we took with us—as "personal luggage"—the first production-built Wolseley Hispano which was delivered to Bois Colombes through the British Aviation Commission in Paris, for examination and test by Hispano themselves.

Leatherhead. R. CLIVE GALLOP.

[Our specialist contributor, J. M. Bruce, comments as follows: "The three-quarter-front close-up of Ball in the cockpit [reproduced herewith] is quite new to me, although a side view taken on the same occasion is well known. It will be noted that at the time the aircraft, A.4850, had no Vickers gun, and that it had a non-standard cut-out in the centre-section. Furthermore, it had a small plain windscreen *before* the squadron left England."

Alluding to another picture, showing a line-up of No. 56's S.E.5s at London Colney, Mr. Bruce remarks: "Note that the four machines at farthest left have some kind of coloured markings on their wheels, and that all machines except Ball's still have the 'greenhouse' cockpit canopy. Moreover, Ball's is the only machine without the external gravity tank above the centre-section. It therefore seems that Ball's machine may have had a completely new centre-section, made perhaps to his own specification. The officer photographed in the cockpit of A.4862 is Lt. R. T. C. Hoidge, who later went on to score twenty-seven victories."—Ed.]

The S.E.5 photographs referred to by Mr. Gallop in his letter and by J. M. Bruce in his comments appended to it

Fuel for the Inner Man?

I WAS very glad to note the interest being taken by *Flight* (June 5 issue) in that fascinating fluid H.T.P., or high-test peroxide.

While, of course, its aeronautical and astronautical use is probably well known to your readers, your eminent contributor Roger Bacon, with his unerring knowledge of the forefront of technological progress, has disclosed—in his account in "Straight and Level" of the social gathering of the Scruggs group—a new use for H.T.P., as an additive to gin.

Both drinks (lox-gin and H.T.P.-gin) mentioned are, of course, appreciated only by people with refined and resistant—not to say refractory—palates. Lox-gin is thought by some to be a rather tasteless drink, owing to its extreme cold. It has its addicts, however.

On the other hand H.T.P. and gin is *the* cocktail for the experienced—and extremely hardened—drinker! To be correct the H.T.P. should be served just slightly chilled from a stability bottle, by choice of borosilicate glass. Its beautiful curved neck will be an object of admiration to all students of modern art.

The cocktail tray and the cocktail cabinet, *par excellence*, must be made of compatible material and pickled—like their owners. I am told that designs in aluminium of 99.5 per cent minimum purity, with fluon trimmings, should be available in the not too foreseeable future at the leading furniture stores.

It has been reported that in America H.T.P. has been used to propel soldiers into the air with rockets strapped on to some appropriate lower part of their anatomy. With this drink, I suggest there is no need for such refinements; self-propulsion would follow naturally.

Your correspondent R. L. H. of Woodford, in the same issue, records in his poem about the hapless Pioneer an interesting phenomenon—of the sands of the range turning red with fuel and H.T.P. Was it red-hot? Or doubtless some form of surface combustion? But I hardly think that the monkey passenger was writing his will. No! What he was doing, of course, was writing a pretty strong letter to the Flying Control Officer. He was annoyed at all that H.T.P. going to waste on the sands of the range and he was thinking of all the gin and H.T.P. cocktails it would have made!

Harpenden, Herts. ALEE JACKIE.

Not Interested

ROGER BACON says last week that I am interested in low air fares, but this is not so. My husband and I always travel by British Railways for our annual holiday to Littlestone-on-Sea in Kent.

Chorley Wood, Herts. (MRS.) B. JONES.

FORTHCOMING EVENTS

Oct. 4-16. Seventh Anglo-American Aeronautical Conference, New York.
Oct. 6. IATA: Dr. Albert Plesman Memorial Lecture. "Supersonic Flight," by Hall L. Hibbard, at Delft, Netherlands.
Oct. 7. R.Ae.S. Graduates' and Students' Section: "Lunar Probes," by J. E. Allen.
Oct. 7. R.Ae.S. (Weybridge Branch): "Fatigue in Modern Aircraft Structures," by D. M. McElhinney.
Oct. 9. Helicopter Association: "The Programme of Development Testing for a Helicopter," by T. G. G. Newbery.
Oct. 14. Society of Instrument Technology: "An Automatic Analogue Computer for Missile Homing Investigations."
Oct. 22. R.Ae.S. Astronautics and Guided Flight Section: "Problems of Interplanetary Navigation," by T. R. F. Nonweiler.
Oct. 27. Radar and Electronics Association: "Electronics in Supersonic Flight," by F. W. Page.
Oct. 28. R.Ae.S. Graduates' and Students' Section: "Setting of Aircraft Specifications," by R. H. Whitby.
Oct. 30. R.Ae.S.: "Man-powered Aircraft, Theory and Practice," by H. B. Irving, Dr. D. R. Wilkie, T. R. F. Nonweiler and B. S. Shenstone.

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